August 2, 1965

NOTES 8-2-65 BALCH FS 8/2 B 8/2

1. A work stoppage may well result at such time as directions are given to GE to have its cryogenic cleaning and installation subcontractor (ConAm) install components cleaned in Huntsville which is required because ConAm does not have the capability and cannot obtain the capability, nor is there another source available, to do the required cleaning if our schedules are to be met. All possible action is being taken to avert a strike, if possible, and to minimize the effects of one if one occurs. No Huntsville-cleaned components are to be installed until further notice. No adverse effect on schedule will result yet. ✓

J.B. All that because Eaton refused to accept Flantz. Suggest you rub that in! B

2. The reported $26 million dollar cut in MTF Vehicle Support for Fiscal Year '66 is being assessed. ✓

3. Diaz and Lilly are expected at the MTF on Tuesday and Dr. Mueller possibly on Friday. ✓

4. MTF Central Telephone Exchange is scheduled for cutover on Sunday, August 1, 1965. On-site telephone difficulties will be greatly alleviated. The Site Manager's telephone numbers will be 688-2121 and 688-2122. ✓

NOTES 8-2-65 BELEW 8/2 B 8/2

F-1 ENGINE F-1 Engine Project Management/Contractor Quarterly Review was held at Canoga Park, California during the past week.

The first "high-braze-strength" (gold plated) FRT configuration injector arrived at MSFC Test Lab on July 29 for extensive testing.

Shipment of engines F-4018 and 4019 will be delayed about 10 days for additional checkout because the LOX system of engine F-4019 and the Canoga final checkout station GN_2 system had oil residue contamination.

Lee B please notify KSC B

Early on July 28, an overheated bearing in one of the two 1,000 g.p.m. LOX transfer pumps in the LOX storage system at NASA/RETS, EAFB caused a fire, damaging the pump. In order to enable acceptance testing to continue, we are using the three 300 g.p.m. LOX pumps in the R&D test area to route LOX to the acceptance test area through a connecting loop. This action restricts R&D testing and slows acceptance testing because of lowered pumping capability.

J-2 ENGINE R&D first 230K/5.5 MR engine (J005-2) is presently installed in VTS-3A for evaluation.

Five J-2 engines were delivered during July.

Additional emphasis is being put on simplification and management of the J-2 operating procedures and parameters in view of DAC and S&ID inputs to you during your trip week of July 26.

The cluster J-2 engine firing on the S-II Battleship was shutdown at 58 seconds of mainstage operation Tuesday, July 27. The premature shutdown was initiated by a LOX pump bearing coolant overtemperature indication. This indication was caused by hot gas leaks from a pressure port on the gas generator burning instrumentation lines.

H-1 ENGINE All H-1 engines performed satisfactorily during the flight of SA-10 Friday, July 30. Initial data indicated normal inboard engine cut off at 147.5 seconds.

The last four H-1 production engines for S-IB-5 have been accepted at Neosho and are scheduled for shipment to Michoud this week.

RL10 ENGINE The Saturn I vehicle (SA-10) was successfully launched on July 30. The six RL10 engines fired for the full required duration. Total accumulated flight time for the RL10 engine is now 5.3 hours.

The Quality and Reliability Assurance delegation agreement between MSFC and the Navy for inspection type services at Pratt & Whitney has been agreed upon.

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI The modified formal MSFC qual engine has successfully passed sinusoidal sweep and random vibration testing in each of three mutually perpendicular directions at the S-IVB input vibration levels. The remaining MSFC qual testing (shock followed by Mission Duty Cycle hot firing to catastrophic failure) is scheduled for completion during the week of August 2.

NOTES 8-2-65 CLINE 8/2 B 8/3

1. VIBRATION TESTING OF THE 200V INSTRUMENT UNIT: (Reference NOTES 7-12-65 CLINE, paragraph 3) The recommended modifications to the instrument unit have been incorporated into IU 201 without any affect on the schedule for SA-201.

2. PROPELLANT DEBRIS VALVES: (Reference NOTES 7-12-65 CLINE, paragraph 1) The debris valves are located between the KSC propellant fill and drain lines and the ground half of the umbilical propellant couplings.

The purpose of the valves is (1) to prevent any propellant gases or liquid from escaping when the service arms are rotated against the umbilical tower (after signal to eject umbilical carrier) and (2) to prevent launch debris and contaminants from entering into the propellant lines on the service arms after launch.

The valve is pneumatically operated and is designed so that if pneumatic pressure is lost to the valve during propellant transfer the valve remains in the open position termed as "fail at last position."

3. S-IVB-201 10-SECOND MAINSTAGE FIRING SCRUBBED: A loading test and 10-sec. mainstage firing was scheduled for 7-27-65. The loading test was successful, but the firing was scrubbed due to a leak in a facility cold helium console that caused improper valve operation.

4. TWO S-II BATTLESHIP SCHEDULED FULL DURATION FIRINGS TERMINATED PREMATURELY: The first attempt was terminated at T + 1.14 seconds by expiration of the ignition phase timer due to malfunction of the ignition detector probe on Engine 2011. The second firing was cut off when the LOX pump bearing coolant temperature redline was exceeded, due to a LOX fire at the GG on engine #2. Most of the fire damage was in the electrical harness and repairs should be completed by 8-2-65 at which time another full duration firing will be attempted.

5. S-IC-T STATIC FIRING TERMINATED PREMATURELY: The scheduled 40-second run ended after 17 seconds when the LOX pump inlet pressures dropped below the minimum redline valve. The pressure drop occurred when the LOX ground supplementary pressurization system malfunctioned.

Attachment #1: NOTES 7-12-65 CLINE

NOTES 7-12-65 CLINE

1. S-IVB STAGE UMBILICALS: During qualification testing of the S-IVB propellant debris valve, the valve failed to open after thermal shock tests. The reason for failure has not been determined at this time. Furthermore, four quick disconnect couplings failed qualification testing and have been returned to the vendor for modification. No date has been received from Douglas Aircraft Company on when they can deliver fully qualified valves and couplings to MSFC. The S-IVB aft umbilical that was shipped to the Cape, in support of the Saturn IB wet test, was short these items.

2. F-1 INJECTOR CRACKS: The injectors on five of the six S-IC static test vehicle engines including the spare experienced ring-to-land separation and to a lesser extent ring to radial baffle separation during recent tests at MSFC. Because the injectors to be used in the first flight vehicles (501 and 502) are identical to the S-IC-T injectors, the 501 and 502 engines will be retrofitted with an improved injector that was already planned for 503 and subsequent vehicles. It will require some reallocation of injectors but will be done without effecting the S-IC-501 launch schedule.

3. VIBRATION TESTING OF THE 200V INSTRUMENT UNIT: This testing was completed at Wyle Laboratories, Huntsville, Alabama, during June 1965. Significant problems encountered were debonding of numerous component mounting structures from the instrument unit skin and excessive vibration amplification by several of the component mounting brackets. Problem areas of the instrument unit included the gas bearing supply panel, launch vehicle data adapter and digital computer, the flight control computer, and the ST-124 guidance platform. These areas were redesigned and successfully retested to the qualification environments as specified in Zone 16 of Internal Note IN-P&VE-S-63-1 (Saturn IB Vibration and Acoustics Specification). Redesigns consisted of the addition of mechanical fasteners to either supplement or replace the bonding adhesive, and the utilization of new mounting techniques for the gas bearing supply, launch vehicle digital computer, and the flight control computer. Retesting was completed on 6-28-65. Recommendations have been made to cognizant groups that these redesigns be incorporated on all Saturn IB and V flight instrument units.

NOTES 8/2/65 CONSTAN 8/2

S-IB

Wrap-Around Lines - Qualification Problem

Meetings between MSFC and CCSD during the week of July 26, 1965, have resolved the outboard LOX and fuel wrap-around line problems as follows:

S-IB-1 and S-IB-2 - S-IB-1 and S-IB-2 will be flown with suction lines as are now installed.

S-IB-3 - Flexonics wrap-around lines installed on S-IB-3 will be exchanged for Solar lines.

S-IB-4, S-IB-5, and S-IB-6 - S-IB-4, S-IB-5, and S-IB-6 will be flown with Solar lines incorporating an internal seal weld on all bosses.

S-IB-7 thru S-IB-12 - S-IB-7 through S-IB-12 will have suction lines with unnecessary bosses removed, 3/4" bosses reduced in size, and additional production controls.

S-IC

Final agreement was reached between Marshall, Michoud, and The Boeing Company on the technical and business requirements necessary for issuance of an RFQ to incentivize the contract.

NOTES 8/2/65 COOK 8/2 8/3

1. PERFORMANCE EVALUATION, SINGLE SUPPORT CONTRACTS (PEB): This office participated with Colonel Fellows and other members of the MSFC PEB with personnel of Michoud Operations for the purpose of exchanging ideas and experiences in the evaluation of Cost Plus Award Fee Contracts. Since the management of these type contracts is relatively new to MSFC, the cross-pollinization of ideas and experiences proved very fruitful.

2. FACILITY REQUIREMENTS FOR ESE: In response to General Phillips' recent emphasis on the need for establishing facilities for parallel operations for Saturn IB and V ESE, a survey is being conducted within R&D Operations to locate approximately 12,000 square feet of suitable floor space. This survey will be completed early this week with a recommended solution presented to R-DIR for final decision.

3. SUPPORT OF SATURN IB/CENTAUR PROGRAM BY R&D OPERATIONS: As the Saturn IB/Centaur Program progresses, it is evident that increased effort by our Single Support Contractors will be utilized. When the support contractor program was presented to Mr. Webb, it was clearly pointed out that the total man-year projections and estimates of first contract year costs, derived from calculations based on projected man-hours, were based on the then-approved programs. At that time, the Saturn IB/Centaur was not an approved program, and funds were not included in the Vehicle Support account for IB/Centaur work. As was agreed, this work is being conducted within our existing resources for FY-66. In recent discussions with IO, we have advised that it appears, by close management, we can provide for the IB/Centaur work within our man-hour and funding ceilings established for FY-66 for the single support contracts. For FY-67 and subsequent years, recent discussions with Mr. Reinartz and the Executive Staff indicate this program should be budgeted for separately.

NOTES 8-2-65 DANNENBERG B 8/3

1. Manned Space Flight Experiment Board (MSFEB) - Mr. Denicke announced that the status of the board Executive Secretary has been changed. In the future, he will not report to Dr. Mueller, but to Mr. Gray, Advanced Manned Mission Program Office. - In addition, Mr. Denicke announced his impending retirement in October or November 1965. ✓

2. Experiment Coordination - R-RP (Dr. Schocken) has submitted an experiment proposal to study the thermal and electrical contact conductance in various metals used for space vehicles. The proposal will be handled as MSFC #10 "Contact Conductance Study." ✓

3. In-Flight Experiment Budget - Figures for POP 65-3 have been prepared and submitted to R-OM as follows:

FY 66 - $6.655 M
FY 67 - $12.285 M
FY68 - $10.955 M
FY 69 - $10.455 M
FY 70 - $7.860 M ✓

4. Interim Status Report on Working Group Review - Re Notes 7-12-65 Dannenberg (Attachment 1) - Your question is being answered by separate memo. ✓

NOTES 7-12-65 DANNENBERG

B 7/19

7/12

1. Experiments Coordination

IU Experiments Integration - An IBM study on experiments covering capabilities of the IU, with typical examples, has just been completed and will be made available to you this week. ✓

Little Joe II - White Sands technical representatives will be at MSFC on 7-15-65 for discussion of an R-AERO (Dr. Rechtien) proposed experiment to determine unsteady aerodynamic loads on available Little Joe II vehicles. ✓

2. Crew Safety - The preliminary IB Crew Safety System (automatic plus manual abort) is presently being tested in the Ling-Temco-Vought Spacecraft simulator at Dallas, Texas. MSFC members of the Crew Safety Panel have been offered an opportunity by MSC to fly the simulator this week. ✓

3. Interim Status Report on Working Group Review - An R&D Operations position was presented to the R&D Council and accepted in principle: Working group-type activities are required for R&DO to support IO (to include interface with contractors). They will be performed as a line responsibility, but require clearly defined authority (not expressed in existing laboratory charters) and provision for permanently assigned group membership. On this basis, discussions with IO have been initiated. As soon as agreement is reached in sufficient detail your approval will be requested prior to implementation.

Hsun. Seidues → Do you mean to say that not a single working group can be abolished? That's quite contradictory to the story I got. I had the impression that while some working groups must definitely continue, others should be abolished now. B

Attachment 1

NOTES 8-2-65 GRAU

1. S-IC QUALIFICATION TEST PROGRAM: The qualification test program is approximately 70% complete. All critical items in Category I that are necessary to completely activate the S-IC-T vehicle are complete with the exception of the LOX vent and relief valve for which an acceptable work around has been adopted. With this configuration it is possible to prepare for automatic firing.

2. RL-10 ENGINES: Agreement has been reached between this Laboratory, Engine Program Office and the Bureau of Naval Weapons concerning MSFC delegation of quality and reliability functions to the Navy at Pratt and Whitney, West Palm Beach, Florida. It was agreed that the Navy would place a total of 12 personnel at West Palm Beach until January 1, 1966 at which time the function will be re-examined in light of program requirements. Target date of effectivity will be 60 days after Navy acceptance of the delegation.

3. ACOUSTIC SPECTROMETER SYSTEM: W. W. Dickinson Corporation presented a lecture/demonstration to approximately 35 representatives from Propulsion and Vehicle Engineering Laboratory, Manufacturing Engineering Laboratory and this Laboratory, of the Acoustic Spectrometer System (Helical Waveform Ultrasonic's System) developed under a supporting research contract with this Laboratory. Much interest was raised in the possible use of the equipment for bonded structure testing. Although the system was tooled up for weld or plate edge propagation, bonded structure testing conceivably could be accomplished. We are reviewing, with the contractor, the possibility of using the system for Centaur shroud testing. Additional testing and evaluation of the equipment will be accomplished at MSFC to establish accuracy, sensitivity and ~~repeatability~~ repeatability in detecting flaws in S-IC skin panel segments.

NOTES 8/2/65 HAEUSSERMANN B 8/2 B 8/3

1. S-IC SERVOACTUATOR: Further evidence of a design problem in the Moog S-IC servoactuator is being obtained (previously mentioned in notes of 6/14, 7/6 and 7/26). In summary, a total of 5 discrepancies have been noted as a result of S-IC-T static firings. Two actuators have developed null shifts of approximately 0.7° engine deflection due to cracking of bearing housings in the mechanical feedback follower mechanism. Three actuators have assumed a hard-over position at shutdown - one due to an unseated mechanical feedback spring, one and possible two (the latter is still being analyzed, having occurred on the last firing) due to a breaking of a braze joint between the piston rod and feedback cam.

The problems encountered during these S-IC-T firings have been due to excessive vibration levels at and immediately after engine cutoff. The servoactuator was designed to withstand the expected vibration levels of 20g sine and 30g random vibration. Special measurements on one actuator during last firing of S-IC-T (7/29) showed levels of 240-245g peaks in almost a sinusoidal shock wave application pattern of approximately .01 second duration at cutoff. The vibration levels other than at cutoff were in the 10g-15g range.

As a result of these actuator failures several design changes have been incorporated in the Moog servoactuator. A total of 6 modified units will be shipped from the vendor by 8/6. Their allocation will be as follows:

4 pcs - S-IC-501
1 pc - Qualification Tests
1 pc - S-IC-T

The other 4 units on S-IC-501 are Hydraulic Research actuators. The test stand experience with HR actuators is limited, but so far no problem has been uncovered due to the higher vibration.

The present plan of action to verify the Moog re-design is to vibrate the valve and feedback mechanism to determine the maximum level which can be withstood. In addition, an attempt will be made to obtain further vibration instrumentation on all actuators for the static firing scheduled for 8/5 to verify the operating environment.

2. STATUS OF VERTICAL LINEAR ACCELERATOR (SULINAC): The building (tower) which houses the facility is complete and all support hardware is installed. Accelerator subassemblies are in fabrication and were scheduled for completion by 8/30/65. The facility was to be available for operational use on 10/1/65. It appears that unforeseen difficulties on the part of the contractor may cause a delay of approximately three (3) months. A more detailed status report has been forwarded to Mr. Rees 8/2 in response to his request at the Facilities Review Board meeting 7/27/65.

NOTES 8/2/65 HEIMBURG 8/2 B 8/3

1. F-1 ENGINE, WEST AREA

Engine F-2009 with the gold brazed injector will be installed next week. Testing will be initiated on or before 8/13.

2. S-IB-201

The data presentation for SA-29 was held by CCSD on Monday, 7/26. Leak checks and functional tests were completed on the stage. After removal of the static test hardware, the stage was removed from the tower on Thursday, 7/29. Barge instrumentation was installed and the stage loaded on the barge Palaemon on Friday, 7/30. The barge left MSFC Sunday night, 8/1.

3. S-IC

Test S-IC-09 was conducted at 5:56 p.m. on 7/29. The test duration was 17.6 seconds of mainstage. Cutoff was given by an observer watching the lox pump inlet pressure. The facility lox tank GN_2 auxiliary pressurizing system did not function properly which let the tank pressure decay. Additionally, the gox flow control system did not operate as expected thus contributing to tank pressure decay. No stage damage was noted during post-static inspection.

4. S-IVB-201

Following the first firing attempt on Tuesday, 7/27, a second test was attempted to Saturday, 7/31, but resulted in automatic abort just prior to start. The reason for the abort has not been completely determined at this time. Another firing is planned for Wednesday, 8/4.

5. S-IVB, MSFC

The engine control assembly was received Wednesday, 7/28, at 8 p.m. The battleship stage, facility, and engine were checked out and test S-IVB-001 was attempted on Friday, 7/30. At approximately X-5 minutes it was determined that the facility heat exchanger was not chilling the chamber adequately due to frozen contaminants (as yet of an undetermined nature). The test was cancelled. It is rescheduled for 8/2, at 6:30 p.m.

6. S-II BATTLESHIP

Test 018 on 7/27 was terminated at 58 seconds when a redline instrumentation cable was burned; suspected hot gas leak on No. 2 engine GG.

Test 019 on 7/30 was terminated at 62 seconds when control cable to helium solenoid burned causing No. 2 engine automatic cutoff.

NOTES 8-2-65 HOELZER B 8/2 B 8/3

USE OF PERT IN COMPUTER SYSTEMS AND DESIGN IMPLEMENTATION:

The Program Evaluation and Review Techniques (PERT) is being used in the design and implementation of the data handling aspects of the configuration management system on a trial basis. If successful in this area, plans are to incorporate PERT as a management tool in similar large system areas. ✓

NOTES 8/2/65 JAMES 8/2 B 8/3

S-IB-1: The booster is in final preparation for shipment to KSC. Working with P&VE and CCSD, we have completed an extensive review of the LOX and fuel wrap-around lines (the type hardware which has been failing in Qual-test). Both the actual hardware on the stage and the inspection X-rays and other records were reviewed. Our decision is to fly with the current hardware installed on S-IB-1. The overall problem of qualifying this hardware is still under review.

I.U. 201: Working on a 24 hour basis, we expect to complete assembly of I.U. 201 in about another week. We are currently engaged in some modification and clean-up work. The last items of GFE (distributors) are due to be delivered to IBM today. We still plan to start electrical checkout in about 3 weeks. Checkout station verification started last Thursday and we are projecting approximately 20 days for station verification and program verification. So far we have only encountered minor problems with the checkout station and we still are working toward a mid-October delivery of the I.U.

Additional slippage of delivery from IBM Owego of the LVDC and LVDA has occurred. Deliveries for I.U. 201 are currently predicted for early September, however, more slippage is anticipated. If this further slippage materializes, we may be pushed into a position of installing this equipment to the I.U. at the Cape. We will work to get the equipment in for at least a minimum checkout period in the factory if at all possible.

S-IVB-201: We had planned a short duration firing last Tuesday, however, late in the countdown a valve in a pneumatic console demonstrated sluggish action and the 10 second firing was cancelled. A successful propellant loading had been completed and since both the stage and other equipment, with the exception of the valve, had performed satisfactorily, it was decided to drop the 10 second firing and proceed to the full duration firing. This firing was scheduled for Saturday afternoon. After proceeding to approximately T minus 60 seconds in the countdown, at which time we initiate power transfer, we experienced an excessive voltage drop which automatically cut in the auxiliary power system. This power system only provides shut-down power so the computers were cut out automatically and the countdown stopped. When this occurred, among other things a ground helium system valve shut down and irregularities in the ground helium system occurred. The ground helium system first stage regulator reacted too slow for a nominal safety shut-down condition and caused downstream relief and vent valves to open under excessive pressure resulting in damage to the ground helium system. DAC started recycling for firing preparation Sunday and we hope to fire on Wednesday.

NOTES 8-2-65 KUERS

8/2 B 8/3

1. Fuel Exclusion Riser Problem in S-IC-502:

A tear in the cover of the exclusion riser developed during the hydrostatic testing of the -502 fuel tank. It is felt that flexure of the lower bulkhead while under proof pressure caused the damage. The damage to the cover allowed the test fluid to penetrate into the foam of the riser and to the bottom of the bulkhead creating a corrosion hazard if not removed. It has, therefore, been necessary to remove approximately 90% of the foam segments to insure complete removal of the entrapped fluid. While removing the foam blocks, fracture or shear of the foam segments, and also debonding at the bottom, was discovered probably as a result of the flexing and permanent setting or deformation of the bulkhead under the test pressure.

The repair by bonding new foam segments into place and using this time a new higher-strength, open-weave fabric is underway. Refitting and rebonding will require approximately 16 days around-the-clock work until testing of this tank can be resumed. Since we were about one week ahead of our schedule, we hope to absorb this repair load without affecting the delivery date of -502 to QUAL Lab.

Similar failures of this fuel exclusion riser have occurred at hydrostatic testing on -T, -501, and -F (at Michoud). Mr. Urlaub assigned an action item to The Boeing Company at the Quarterly S-IC Review Meeting last week to investigate as a back-up design the feasibility of using an inflatable bladder in lieu of the rigid foam block exclusion riser.

2. Transfer of Electron Beam Welder to Boeing, Michoud:

Our EB welding machine, including the split vacuum chamber and support fixtures for welding of Y-rings, has now been shipped to Michoud. The Boeing Company will utilize this equipment for welding of unmachined Y-ring billets with the goal of ultimate replacement of the presently used MIG welding process. The basic capability of this equipment for this application has been proven during our development program here although our approach had been to weld finished machined ring segments. This application as proposed by Boeing requires some modification to the chamber and fixturing and the uprating of one of the EB guns. It will finally result, we are convinced, in fabrication of stronger and more reliable Y-rings at lower cost.

NOTES 8/2/65 MAUS

1. IMPORTANT VISITS

   a. Mr. Cortwright, Office of Space Science and Applications - We have confirmed with Ed Cortwright's office that his visit to MSFC will be on August 11. He will be accompanied by Mr. Vince Johnson, Director of Launch Vehicle and Propulsion Programs. They will arrive at 8:50 a.m. and leave at 4:15 p.m. Ray Kline is coordinating the visit.

   b. New MSF People - Gen. Bowman, special assistant to Dr. Mueller, Dr. Rieffel, consultant to Gen. Phillips, and Mr. Hubbard, assistant to Mr. Schneider in Gemini, will visit MSFC on August 18-20 for general orientation. Ray Kline will coordinate this visit.

   c. Bureau of Budget Team - The BOB Team was at Kennedy Space Center last week for their annual visit. The team, headed by Mr. Crabill is scheduled to visit MSFC September 27 through October 1, 1965.

2. GENERAL MANAGEMENT (ADMINISTRATOR'S) PROGRAM REVIEWS - In my 7/26/65 NOTES, I reported that the Administrator's Program Review of Gemini; Manned Space Science; and Advanced Manned Missions, would be on September 21-22. This review has been rescheduled for Wednesday, September 22, with the repeat presentation on Thursday, September 23.

Bonnie

Please find out whether Dr. Mueller, who obviously plans to attend this meeting, will cancel the Management Council Executive Session on that day. Will he move it to another day, or just cancel? B 8/3

We will send Gen. Jones to the Administrator's Review, and will have the Executive session on Sept. 22 as planned. BH 8/4

NOTES 8/2/65 REINARTZ

JGB 8/2 B 8/3

MANAGEMENT MEETINGS:

A. A Saturn IB/Centaur Program Review is scheduled for August 12 in Washington. Invitees include Mr. Ginter, OSSA/Centaur; Mr. Hearth, OSSA/Voyager; Mr. Gabriel, LeRC; Lt. Col. Petrone, KSC; Dr. Burcham, JPL/Voyager; and myself. ✓

B. A Voyager Quarterly Review is scheduled at JPL on August 17-18. I will make a presentation on the status of the Saturn IB/Centaur launch vehicle. This is the initial Voyager Quarterly Review. ✓

C. I have been allotted ten minutes for a presentation on Saturn IB/Centaur at the August 24 Management Council in Houston. ✓

D. The second MSFC/JPL Panel Meeting on engineering implementation is scheduled at MSFC August 25-26. ✓

CENTAUR/SHROUD ALTERNATE ASSEMBLY LOCATIONS STUDY:

The results of this study were given to Mr. Fero, MSF, on July 29. Mr. Fero agreed with the MSFC recommendation that assembly be performed at MSFC and will so recommend to Colonel Russell, MSF. (Not to be submitted to Headquarters.) ✓

NOTES 8/2/65 RUDOLPH

1. The Saturn V Monthly Program Review was scheduled for Tuesday and Thursday, (Aug 3 and Aug 5) in the Saturn V Program Control Center. This monthly Saturn V Program Review is permanently scheduled for the first Tuesday and Thursday of each month. We are again this month faced with major schedule conflict (e.g., POP 65-3 Review on Tuesday, August 3, 1965 and Dr. Mueller's visit for Thursday, August 5, 1965). Current plans are to go ahead with the Saturn V Reviews, recognizing that the Thursday session will most likely be rescheduled based on Dr. Mueller's visit.

2. SA 501 Mission Directive - A Draft copy of SA 501 Mission Directive has been published. Copies have been distributed within MSFC and forwarded to MSF and KSC.

3. S-IC Stage Status:

Qualification Program - 71% of the program items have successfully completed testing as of Tuesday, July 27, 1965. All qualification testing scheduled for completion by December 31, 1965.

S-IC-T - Is scheduled for full duration firing (150 seconds) on Thursday, August 5, 1965.

S-IC-1 - The stage will be delivered to R-QUAL on September 27, 1965 (as scheduled). The R-QUAL Test Complex (GSE Set No. 1) will be operational by September 27, 1965 (as scheduled).

S-IC-D - will be delivered to MSFC on October 15, 1965 (as scheduled).

S-IC-F - will be delivered to KSC on January 21, 1966 (as scheduled). This Stage is currently 5 weeks behind schedule, however, work-arounds will permit make-up of the delay and achievement of the January 1966 delivery to KSC.

4. S-II Battleship Stage - Two attempts to fire for full duration were made on Tuesday, July 27, 1965. The first attempt was cutoff at ignition because of a faulty engine ignition detection probe. The probe was replaced and the system recycled. The second attempt was cutoff at 60 seconds because of an indication of pump bearing coolant overtemp. H_2 fire impinging on coolant transducer causing false coolant overtemp. The fire damaged several cables which were replaced.

The third attempt to fire the S-II Battleship for full duration on Friday, July 30, 1965, was cutoff automatically after approximately 65 seconds of operation. Cutoff was due to loss of He control solenoid signal to No. 2 engine. Firing is rescheduled for this week (August 2, 1965).

NOTES-STUHLINGER
July 26-30, 1965 8/2 | Please use standard format for NOTES.

1. PEGASUS C: Launch was successful. All data systems function properly, both ACM (beacon) and PCM (memory). All telemetered information seems to be excellent, such as hits, hit confirmation data, radiation sensors, the two attitude systems and various thermal measurements and environment sensors. ✓ B 8/3

2. OTS, Now Called Optical Technology AES (OTAES): The SEB action is complete with the selection of two contractors. This will be submitted to Dr. Seamans for approval. The study contracts would fall in category B of the draft #5 of the Phased Program Planning (PPP) document. The word "preliminary design" is a misnomer because this would place it in category C, and the study is not that far along. ✓

3. Woods Hole Meeting: The Woods Hole meeting on lunar AES was highly successful. Two weeks of thorough discussion were wound up in a series of summary sessions last Friday. The scientific community seems to be enthusiastic about the scientific exploration of the moon. The meeting has helped to get the scientists strongly behind it, to obtain an understanding of the project and how they are to work with OSSA and with a field center, which is for the lunar surface generally expected to be MSFC. One of the recommendations of the meeting is that the scientists favor a strengthening of the scientific complement in the government. ✓

4. Total ART/SRT Status:

	PLAN/AUTHORIZED	PROCESSED TO FMO	OBLIGATED	AMOUNTS NOT COMMITTED
OART	15,221,000	14,865,772	13,896,461	355,228
MSF	20,670,000	20,384,410	20,200,074	285,590
OSSA	1,463,000	1,410,560	1,410,560	52,440
OTDA	2,000,000	1,960,123	1,753,366	39,877
TOTALS	39,354,000	38,620,865	37,260,461	733,135 ✓

E.S.

→ Is this Dr. Randall's Optical Technology Satellite? Has it been accepted into AES? Request briefing on procedural plan, omitting tech. details. B 8/3

NOTES 8/2/65 WILLIAMS FD 8/2 B 8/3

1. MSF Proposed Study Program for FY-66. MSFC was requested to comment on the MSF proposed study program for FY-66. The study breakout was based on a $10M program which is about what it has been for the past few years. This does not include AES. Tabulated below is the funding level associated with the MSF and MSFC recommended programs.

	MSFC	MSF
Earth Orbital Studies	$2,100	$1,500
Lunar Studies	800	950
Planetary Studies	850	700
Launch Vehicle Studies	1,600	1,700
	$5,350	$4,850

2. Obligation of FY-65 Funds. We are still in the process of getting the FY-65 money under contract. As you know, much of the money was received only a short time ago ($160K last week) and two to three more months will be required to get the FY-65 study program all under contract.

August 9, 1965

B 8/12

NOTES 8/9/65 BALCH 8/9

1. The most significant occurrence was the failure of the auxiliary crane, S-II, A-2 test stand, during the Corps of Engineers acceptance test. At this time, no exact cause for the failure has been determined. Since the crane was required for use by August 18, 1965, the Corps of Engineers are working on a recovery plan. A work-around plan is being initiated using a mobile crane; consequently, there will be no program impact.

2. The labor dispute involving the plumbers working at Con-Am's Gulfport Cleaning Facility has been settled. Messrs. Tyvoll, Artley and Ling, on August 5, briefed Mr. Rieke of NASA Headquarters and Rieke, Tyvoll, and Artley, along with the local plumbers business agents discussed the matter with International Union representatives. The union will install the valves in question and MTF will investigate the possibility of supplementing the site's cryogenic cleaning capacity through the use of a specially equipped cleaning trailer.

NOTES 8-9-65 BELEW B 8/12

J-2 ENGINE A meeting was held last Wednesday, with R&DO and IO participation, to clarify the J-2 engine start and redline restrictions which DAC and S&ID brought to your attention on your recent trip to the West Coast. It became clear that pre-start requirements have not caused the S-II Battleship program any problems; however, preconditioning requirements and redlines, necessary due to the complication of using two cryogenics, do pose some problems for both stage users. Several actions resulted from the meeting and have been or will be, transmitted to you by Hans Hueter. Our action item is to continue emphasizing the preconditioning test program at Rocketdyne to determine if any of the pre-start requirements can be relaxed and to re-evaluate all redline restrictions with Rocketdyne, P&VE and TEST.

Four production engines were contaminated with high grade SAE engine oil from the compressor which supplies GN_2 for factory leak checks. A flush and purge procedure for decontaminating the engines is being worked out, with MSFC participation. This has delayed the delivery of one engine for SA-501 (S-II) and may have an impact on August deliveries. We will keep you informed as further information becomes available.

Production engine J-2032 has been selected as the Qual I demonstration engine. The engine is presently progressing through post hotfire checkout. The Qual I demonstration program is scheduled to commence the latter part of August following the completion of the Delta-Coca hydrogen tie-in.

An apparently successful acceptance test of SA-201 was conducted yesterday at DAC/SACTO. The engine operated for approximately 451 seconds, including a gimbaling demonstration and programmed mixture ratio.

F-1 ENGINE At the F-1 Engine Quarterly Review held at Canoga Park, California on July 28 and 29, numerous typical problems were discussed. In general, everything appeared under control; one indication is the assessment that the contractor has a good chance of attaining maximum fee on the R&D contract.

Testing at NASA/RETS is continuing satisfactorily and full operating capability should be available within two weeks.

RL10 ENGINE Boeing fired their space propulsion test system for four seconds last week at Boardman, Oregon, in their first hot firing of the RL10 engine. Three more feasibility firings will culminate in a 120 second firing late in August, which will complete the current test series. The objective of these tests is to demonstrate the feasibility of tanking and plumbing inherent in the "side-by-side" tankage required for some space propulsion module designs. This program is being supported by Boeing's Independent Research and Development (IR & D) program using surplus RL10 hardware.

H-1 ENGINE Contract negotiations are scheduled on August 11 through August 13 for the Follow-On 22 Engine Supplement to NAS7-162. These engines will support SA-210 through SA-213. Type of contract is to be CPIF.

The remaining four H-1 production engines required for S-IB-5 were delivered in July as scheduled.

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI The modified MSFC qual engine has successfully passed shock testing (18 shocks total) in each of three mutually perpendicular directions. The Mission Duty Cycle hot fire testing to catastrophic failure was initiated. Completion of hot fire testing has been rescheduled during the week of August 9. The rescheduling was a result of technical problems encountered with the fuel feed system of hot fire testing facilities.

NOTES 8-9-65 CLINE

1. S-IVB-201 ACCEPTANCE FIRING ATTEMPTED TWICE ON 8-4-65: Termination of the first firing is attributable to human error--unnecessary observer cutoff after 6.7 seconds mainstage operation. The second was terminated automatically after 15 seconds mainstage when the computer sensed an event occurring early; actually, the sequence was satisfactory, but the computer and countdown clock were not synchronized--differed by 4 seconds.

2. S-II BATTLESHIP FULL DURATION FIRING ATTEMPTED ON 8-3-65: Actual duration was 3 seconds mainstage operation. Cutoff was initiated automatically by the GG overtemperature device on Engine # 2; a second cutoff signal was manually given when Engine # 2 fuel pump inlet pressure went outside acceptable limits. Indications are that the bellows liner (located just upstream of the facility ball valve) failed and restricted fuel flow. All the liners will be removed prior to the next test.

NOTES 8/9/65 CONSTAN

Negative Report 9G8819

B8/12

B8/12

NOTES 8-9-65 COOK

Negative Report JB8/9

B8/12

9CB 8/9 NOTES 8-9-65 DANNENBERG

1. Experiments - We are preparing for the next MSFEB meeting a number of experiments which are suitable for the "Orbital Workshop" including those which were originally planned for the modified LEM. MSFC will cover the majority of the agenda of the next MSFEB meeting, 9-20-65.

2. Re Notes 7-19-65 Dannenberg - (attachment 1) - The boilerplate Saturn V Model for Little Joe II (which has been offered to us by MSC) would systematically measure unsteady aero dynamics which, at this time, are of some concern for Saturn V. (There is a scaling problem in this area for wind tunnel tests.)

3. Re Notes 7-26-65 Dannenberg - (attachment 2) - It appears that the (very preliminary) test results are close to the lower limit (6%) of the TNT equivalents used for EDS. A presentation of the new results is planned for the next Crew Safety Panel meeting later this month. At this time, it looks like an improvement in the risk factor but not like an elimination of the escape problem from explosion.

8/9 NOTES 8/9/65 GEISSLER 8/12

1. AES - Range Safety: Aero-Astrodynamics Laboratory representatives met with personnel from MSC and KSC and discussed the range safety data and analyses for the SA-209 polar orbit AES missions. It was agreed that the present nominal trajectory will not meet range safety requirements due to S-IVB impact on South America. Therefore, we are generating a new trajectory from which new range safety analyses will be performed, after which we will make a presentation to Eastern Test Range in conjunction with MSC, Headquarters and Cape personnel. This meeting will take place on or about September 1.

2. SA-10 Launch: A full LIEF operation was conducted for the final countdown and launch of SA-10. Ten support requests were received from KSC requiring 18 conferences. Communications facilities were satisfactory. Pre-launch wind monitoring activities were accomplished satisfactorily with a final go recommendation given to KSC at about T-2 hours. The Burroughs 5500 was used for the flight simulations for the first time in parallel with the 7094. Performance was excellent. One problem occurred with the ground level winds being very close to the specified limit. Winds at launch were 17 knots compared to the specified limit of 20 knots.

NOTES 8-9-65 GRAU

1. S-IB INSTRUMENT UNIT CHECKOUT STATION: Verification of the S-IB IU checkout station is currently in progress. A large number of equipment deficiencies have been encountered and substantial time is being lost installing E.O.'s. It is still expected however, that the checkout complex will be ready for hookup to the IU by August 21, 1965.

2. S-IC GROUND SUPPORT EQUIPMENT: Installation of Change Action Memo's (CAM's) into the R-QUAL GSE, the second installation period, began Saturday, August 7, 1965. The CAM kits appear to be in relatively good condition, with only three or four kits now in difficulty. In the area of test procedure verification, progress continues. The last procedure to be verified prior to Networks Firing Sequence has been run and is now being re-programmed.

3. S-IC ACTUATORS: During static firings, problems have developed in the mechanical feedback area of the Moog Servocontrols Actuators. The two problem areas are failure of the cam roller and failure of the cam follower brazed joint. Due to the failures all Moog actuators accepted for S-IC-501 will be returned to Moog for rework.

4. S-IC QUALIFICATION TESTING: Representatives of this Laboratory attended the Boeing Qualification Quarterly Review at Michoud Assembly Facility. There are no problem areas presently known or foreseen in this program. All milestones presently set will be met. Qualification testing, now approximately 75% complete, is scheduled for completion December 31, 1965.

B8/12

8/9 NOTES 8/9/65 HAEUSSERMANN

1. APOLLO-SATURN RELIABILITY AND BACKUP STUDIES: In the determination and assessment of the Saturn V IU reliability, we have established boost environment factors, termed "K Factors", to allow for the prediction of powered flight reliability. Effectively we derate our expected performance from laboratory values during powered flight. These factors vary from 18 to 75 for the various boost phases of the Saturn V flight. We use a value of 1 for all coast phases. (value)

As a result of recent discussions with MSC/MIT, it appears that MIT does not derate their expected performance during powered flight. Using the MSC/MIT factor of 1 for all mission phases reduces the advantages of a backup system to the point that one might consider it unnecessary. The effect of the two approaches on reliability with and without backup is given below:

K Factor Employed	Mission Failures Due to IU No Backup	Mission Failures Due to IU With Backup
1 - 75 (MSFC)	1 per 77 (1.34%)	1 per 125 0.79%
1 (MSC/MIT)	1 per 400 (0.25%)	1 per 625 (0.16%)

W.H. What action do you plan? Presentation to the panel? B

2. S-IC SERVOACTUATORS: The hardover failure on the 7/29 static firing has been identified as a broken braze joint between the feedback cam and piston. Vibration tests on the redesigned valve-feedback mechanism will be at MSFC. There were no hardover failures on the 150 second firing on 8/5; data is being evaluated to verify operating environment.

3. PRELIMINARY LOOK AT SA-10 INSTRUMENTATION: There were 240 measurements on S-IU-10. To date no failures have been found. There were 445 measurements on the S-I-10. There were one total failure and 10 partial failures. Ten of 445 measurements were the aspirator and engine bell calorimeters of engines 3 and 7 - the other was the loss of pulse #1 of discrete fuel level A20-F1. DAC advised good instrumentation performance was experienced on S-IV. Details will be presented in next Evaluation Working Group meeting. Reference Electrostatic Phenomena: DAC advised quick look at data indicates no electrical potential between S-I and S-IV stages during separation.

W.H. Let's pass this on to Dr. Mueller. He's interested in view of imminent Gemini rendezvous B

4. MSFC AUTOMATION BOARD: The degree of automation that we had hoped to achieve during the launches of the Saturn I Block II vehicles was attained as planned. Our automation effort started on SA-6 and was expanded with each succeeding vehicle. On SA-10 there were 82 different test routines and programs used during the pre-launch checkout, and 46 of these test programs were used during the launch countdown itself. These tests were performed automatically by the RCA-110 ground computer after first being called up manually by the test conductor. Of the test programs used during the SA-10 countdown, the majority were Flight Computer programs and Flight Control programs but other programs were used with the stabilized platform, propellant loading, and for monitoring purposes. In all, the SA-10 Computer program involved 45,000 instructions. This is a brief summary of the Saturn I automation effort. A detailed description will be published shortly.

NOTES 8/9/65 HEIMBURG

1. S-IC

The final test, S-IC-10, prior to automating the GSE and updating the S-IC-T stage, was successfully conducted at 4:02 p.m. on 8/5/65. Upon LOX depletion, as planned, the center engine was cutoff by the LOX pump inlet temperature observer at 143.2 seconds of mainstage and the outboard engines 4 seconds later by a cutoff timer. All systems performance was as expected. Next test, automatic, is scheduled for 10/5/65.

2. F-1 ENGINE - WEST AREA

Engine F-2009 with the modified injector braze joint (gold plated) was installed in the F-1 Test Stand on 8/6/65. The first test is tentatively scheduled for 8/11/65. This engine will be subjected to enough starts and test time to determine if this modification has solved the problem of injector ring to the land cracks.

3. S-IVB (MSFC)

Test No. S-IVB-001 was conducted at the S-IVB Test Stand (MSFC) on 8/2/65. The test was scheduled for 8 seconds, however, it was erroneously terminated by a redline observer at 2.12 seconds from engine start signal, otherwise the test was satisfactory. Test No. S-IVB-002 is scheduled for Tuesday, 8/10/65.

4. S-IVB-201

A successful full duration (453 seconds) test was conducted at SACTO on Sunday, 8/8/65, using an automated sequence control. A 1.3% LOX depletion switch gave cutoff.

5. S-II BATTLESHIP

A full duration test was attempted on 8/3/65, which was aborted after 3.2 seconds by automatic GG overtemperature device on the engine. Another firing is planned for 8/9/65 pending rework of the fuel suction lines.

6. RANDOM MOTION VEHICLE SIMULATOR (RMVS) SAT-V GSE TEST FACILITY

Problems have delayed the final acceptance checkout of the command module position. The main problem area is in obtaining the maximum amplitude and frequency. AMF is striving to correct the situation but as yet have not come up with a solution to the problem. Completion schedule is becoming increasingly critical as a I-B access arm is due to arrive this month.

Suggest you advise Ed O'connor

7. BARGE POSEIDON (S-IC BARGE) (NEW ORLEANS)

Vessel's delivery date is now 10/1/65 due in part to our contractor's failure to purchase components required for the modification according to specs and also due to our reject of contractor purchased equipment found sub-standard. Vessel will be ready for the scheduled 10/8/65 S-IC Dynamic Stage shipment provided the nitrogen system installation does not cause additional delays.

B 8/12

NOTES 8-9-65 HOELZER

JB 8/9

Negative Report

B2/12

R D&I NOTES 8/9/65 JAMES

S-IB STAGE: The booster will depart Michoud for KSC today. The stage will be utilized with facility checkout upper stages to verify Launch Complex 34. The second flight booster has completed static firing and is back at Michoud.

S-IVB-201: After unsuccessful attempts at static firing on Wednesday, a full duration firing was successfully completed on Sunday. Cleanup operations are underway and a few modifications have to be installed prior to checkout. We are currently evaluating post static checkout plans and preparing to schedule the remaining work to permit shipment by water to KSC in early September.

SA-201: The Instrument Unit Assembly is expected to be completed on Wednesday of this week. Mechanical and continuity checks will be performed during the period of time while the checkout station is being readied. It appears that the earliest mating of the checkout station and the Instrument Unit for electrical checkout would be about the 21st of August. We still expect to complete the I. U. by late September and currently plan to ship to the Cape by VPG.

SPACECRAFT STRUCTURAL PROBLEM: While at MSC this week, our people learned through discussions that during recent acoustic tests small cracks developed in several places in the Service Module radial beams. The cracks appear to be similar to the ones that occurred in the BP-27 dynamic test article prior to delivery to KSC. MSC is currently investigating and we are following this one closely to determine if there is a significant problem.

NOTES 8-9-65 KUERS

S-IC-501 Progress: Activities in systems installations on -501 have now been increased. While we averaged approximately 200 manhours of installation work per day in July we are now able to accomplish 300 hours daily of actual installation work. Installation of cable harnesses in the Thrust Structure area has now been started. Because receipt of cables in the shop had encountered considerable delays we will start a night shift next week for which we have again to "borrow" some electricians from Boeing, Michoud.

NOTES 8/9/65 MAUS

1. LETTER TO CONGRESSMAN BOGGS - On my 7/26/65 NOTES, you requested copy of the draft letter which we prepared for Mr. Webb to send Congressman Boggs concerning removal of Boeing Research people from the Michoud plant. A copy is attached. This letter has been signed by Mr. Webb.

2. PROGRAM OPERATING PLAN (POP) 65-3 - The MSFC Program Operating Plan 65-3 has been submitted to MSF. Plans were submitted for AO, C of F, and R&D for MSF; and R&D for AR&T; SS&A, OTDA, and OTL.

You will recall that at the Hideaway meeting it was proposed that MSFC accept a sizable cut in FY 66. To date MSF has cut through budget channels $10 Million only. Saturn IB and Saturn V were assessed $5 Million each.

Since MSFC must, by guidelines, use the figures from the last MSF POP submission to Dr. Seamans as a base for comparing this POP submission, it appears that MSFC is increasing its Apollo runout cost. Actually, when compared to the last MSFC submission, the MSFC Apollo runout cost is reduced by $101. Million.

MSFC POP 65-3 Apollo requirements are shown as follows:

MSFC POP 65-3 APOLLO REQUIREMENTS

	FY 65	66	67	68	69	To Comp.	Total *
Saturn I	35.1	.5	0	0	0	0	758.9
Saturn IB	255.5	258.2	208.1	115.2	24.8	0	1020.0
Saturn V	952.9	1187.4	1159.7	1021.0	775.9	527.1	6774.1
Eng. Dev.	166.3	150.7	137.5	100.7	68.7	19.0	1159.6
Total	1409.8	1596.8	1505.3	1236.9	869.4	546.1	9712.6

* Includes FY 64 and prior years.

Attached is a tabulation which shows the AES funding requirements submitted in POP 65-3.

B 8/1

NOTES 7/26/65 MAUS 8/2

1. VISIT OF GENERAL SCHILT - Gen. C. Frank Schilt, USMC (Retired), will visit MSFC on August 12 and 13. Mr. Webb has asked Gen. Schilt to join NASA as a consultant, and Gen. Schilt wants to be sure he can make a contribution before he agrees to serve. The purpose of the visit to MSFC is to review our operations and activities for familiarization purposes. Ray Kline is coordinating with Col. Vogel. ✓

2. AEROSPACE PILOT SCHOOL - The date of July 30 is now firm for the visit of the Air Force astronauts to MSFC. ✓

3. LETTER TO CONGRESSMAN BOGGS - The proposed draft we prepared for Mr. Webb to send to Congressman Boggs concerning removal of Boeing research people from the Michoud Plant has been approved by Dr. Mueller and forwarded to Mr. Webb. ✓ I'd like to see it RE - attached

4. PROGRAM OPERATION PLAN (POP) 65-3 - An internal MSFC review of POP 65-3 has been scheduled for 1:30 p.m., August 3, 1965, in the Tenth Floor Conference Room. Your presence would be welcome, but is not essential. ✓

The main problem that we have in preparation of POP 65-3 is that we have not yet received the OART guidelines. Latest information from OART and MSF is that OART guidelines will be available Wednesday, July 28. This means they can only be considered at management level for minor adjustment. We are proceeding, and expect to meet the August 9 due date in MSF. ✓

5. GENERAL MANAGEMENT (ADMINISTRATOR'S) PROGRAM REVIEWS - We have received the new schedule for the General Management (Administrator's) Program Reviews to be held in FY-66. The first of the series will be September 21-22, on Gemini; Manned Space Science; and Advanced Manned Missions. The review of "Saturn IB, V, J-2 and F-1 Engines; Related Facilities; and Apollo" is scheduled for November 16-17. ✓

Ray Kline will publish the full schedule and coordinate MSFC participation in these reviews. ✓

H.M. ✓

This seems to collide with MSF Program Review and Management Council Executive Session, both of which require Dr. Mueller's presence. Please clarify. B

(SEE 8-2-65 NOTES WITH COMMENTS MAB)

JUL 20 1965

AC/R. L. Callaghan

M/G. E. Mueller

Reply to Congressman Hale Boggs - Michoud/Boeing research effort

Enclosed is a suggested reply to Congressman Boggs regarding his inquiry on the transfer of Boeing personnel out of Michoud.

Original signed by
George E. Mueller

George E. Mueller
Associate Administrator
for Manned Space Flight

Enclosure

cc:
MS/Bogart
MP/Lilly
MA/Seaton
MSFC/Ray Kline

MCL:WFMoore:cas x20248 7-8-65

CONCURRENCES:

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U.S. GOVERNMENT PRINTING OFFICE 16—77210-1

cas/Sperry/27454
July 7, 1965

Suggested reply to Congressman Hale Boggs

B 8/12

I am writing in response to your inquiry regarding the relocation from our Michoud installation of Boeing employees engaged in Boeing Company-sponsored research work. Your understanding that these employees have been directed to relocate from Michoud is correct, and I would like to explain why this action is necessary.

The Michoud Assembly Facility is a government-owned, contractor-operated (GOCO) plant being used by Chrysler to assemble S-I and S-IB booster stages for the Saturn I and Saturn IB launch vehicle programs, and by Boeing to assemble S-IC stages for the Saturn V program. It is our policy that under such GOCO arrangements, the facility will be used solely and specifically for these authorized programs, and will not be used by in-plant contractors to work on projects that bear no direct relationship to these authorized programs.

Unless we closely adhere to such a policy, we run the risk of overtaxing the facility and manpower resources we so sorely need to execute our on-going programs - in this case, the manned lunar landing program.

CONCURRENCES:

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The Boeing Company at Michoud has engaged in company-sponsored research activities which are not directly related to the Saturn V work that Boeing is contractually engaged to perform at the Michoud Facility. Approximately eighty Boeing employees are involved in this research work, and about one million dollars has been budgeted by Boeing for this effort during the last half of the calendar year 1965.

The Marshall Center studied this matter and determined that the conduct of these research activities at the Michoud Plant, in the light of the above policy, should be discontinued. Dr. von Braun has personally taken part and as late as June 11 visited Michoud to discuss the issue with Boeing top management.

As you requested, we have reviewed the action taken by our program managers in this matter. We believe their action to be fully supported by the facts and to be in the best interests of the government.

We appreciate your continuing interest in the space program. If we may be of further assistance in this or any other matter, please do not hesitate to call on us.

/ss/James E. Webb

CONCURRENCES:

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ATTACHMENT TO NOTES 8/9/65 MAUS

B 8/12

The following table summarizes the AES funding requirements being submitted in MSFC POP 65-3. Essentially the changes from last submission are the elimination of MOLAB studies and revised cost to completion estimates in the lunar surface program, and a significant increase in MSFC's participation in the earth orbital program. The last column shows a "total this decade" for consideration against Apollo's probable $20 billion cost.

POP 65-3 SUBMISSION FOR
AES AND 6 X 6 LAUNCH RATE *

(DOLLARS IN MILLIONS)	FY 66	67	68	69	TOTAL FY69
MSF (AES + 6 X 6)*					
LUNAR SURFACE					
MSFC POP 65-3	17.2	97.5	172.7	142.0	429.4
MSFC POP 65-2	17.2	99.5	174.7	152.0	443.4
EARTH ORBITAL					
MSFC POP 65-3	22.0	138.0	316.0	289.0	765.0
MSFC POP 65-2	7.3	20.0	30.0	30.0	87.3
SATURN IB & V L/V'S*					
MSFC POP 65-3	-	103.8	392.3	680.0	1176.1
MSFC POP 65-2	-	114.5	400.8	694.9	1210.2
TOTAL:					
AES R&D PLUS L/V'S					
MSFC POP 65-3	39.2	339.3	881.0	1111.0	2370.5
MSFC POP 65-2	24.5	234.0	605.5	876.9	1740.9
OSSA (AES)					
MANNED LUNAR SCIENCE					
MSFC POP 65-3	6.05	36.0	49.0	40.0	131.05
MSFC POP 65-2	7.4	15.0	15.0	15.0	52.4

* 6 X 6 Minus Saturn IB/Centaur L/V's

JB 8/9

NOTES 8/9/65 REINARTZ

B 8/12

MEETINGS WITH LERC: LeRC, GD/C, and MSFC met at MSFC on August 5 and 6 to discuss structures, umbilicals, and environmental control systems. Payload adapter and forward umbilical areas were resolved as far as basic concepts were concerned. The aft skirt is still unresolved although MSFC agreed to use the Centaur LH_2 fill and drain valve provided it can meet leakage requirements. An impass was reached on the aft skirt and aft umbilical. Based on the separation plane which MSFC has chosen, using the LeRC aft umbilical would require a pull of 60 pin connectors at an angle rather than straight-away. MSFC proposes to change the umbilical to a fly-away disconnect and use 30 pin connectors. The LeRC position as stated by Nettles is that LeRC is under NASA Headquarters direction not to change the Centaur if the Shroud can possibly be designed around any problems. He stated that no tradeoff studies should be conducted on any sub-system as long as a way can be found to accommodate the design into the Shroud. Nettles does not intend to give MSFC detail information that will allow us to perform tradeoff studies unless he agrees a study is required. Nettles also indicated that Colonel Russell could not direct LeRC that the Centaur would come to MSFC for assembly. (Not to be submitted to Headquarters)

Ed O'C. Where is MSFC's launch vehicle systems engineering responsibility? B

SATURN IB/CENTAUR PROGRAM DEVELOPMENT PLAN: The Program Development Plan has been received from MSF. Comments are requested to this PDP by August 23.

9AB819 NOTES 8/9/65 RUDOLPH B8/12

1. Incentive Contract Conversion:

S-IC Stage - The official RFP for conversion of Contract NAS8-5608 was delivered by Michoud Assembly Facility to Boeing on Monday, August 2, 1965, on schedule. Firm cost proposal is expected on Wednesday, September 1, 1965.

S-II Stage - Final revisions to the RFQ, including Saturn V Model Work Statement, the Saturn V Logistics Work Statement, and Incentive Criteria, issued to Contractor on August 5, 1965.

S-IVB Stage - Evaluation of DAC's Task Plan Proposal is continuing. Currently planning to start negotiations on Wednesday, September 1, 1965. This tight schedule depends on receiving additional data, particularly revised program documents from DAC as currently scheduled.

2. S-IC-T Stage Captive Firing Program - A full duration firing (150 sec.) was conducted on Thursday, August 5, 1965. The first automatic firing is scheduled for Friday, September 24, 1965.

3. S-II Battleship Stage - A full duration firing was attempted on Tuesday, August 3, 1965. Terminated by gas generator overtemp of #2 Engine. The cause was a collapsed bellows liner in hydrogen inlet ducts. Liners found unnecessary in hydrogen lines and were removed from all engines. The next scheduled attempt for full duration firing is today, August 9, 1965.

4. S-II-T Systems Checkout Design Review - scheduled for August 24-27, 1965, at MTF.

5. S-IVB Dynamics Test Stage - Conversion hardware to support Configuration III testing at MSFC is scheduled to arrive on Saturday, August 14, 1965.

6. Instrument Unit Ground Test Program:

S-IU-200V - The vibration test program was completed at Wyle on Saturday, July 31, 1965. Loading and transportation testing successfully conducted using the "Pregnant Guppy" on Friday, August 6, 1965.

S-IU-200/500S - The second Saturn V Max Q condition, loading over the batteries area, completed on Tuesday, August 3, 1965. The third Saturn V Max Q condition, loading over the access door is to be run this week, (August 9, 1965).

S-IU-500V - Component assembly is in progress; expected to be delivered to Wyle this week for test preparations.

NOTES 8/9/65 SPEER

1. AS-201 Mission Rules Criteria: The Ad Hoc group established by Christensen to formulate criteria governing Mission Rules for the first Apollo mission has essentially completed its work. Of special interest to MSFC are the abort criteria during launch vehicle powered flight: Total loss of thrust on either stage; and exceeding trajectory limits ("FIDO limits"). These limits have been established by MSC and checked by MSFC (AERO). They were found to be acceptable and would provide adequate engineering data even in case of malfunctions leading to abort. ASTR will provide 201 software consistent with these abort criteria.

2. LH_2 Experiment Flight Control: In accordance with Christensen's decision to perform the LH_2 flight control functions from MCC-Houston and to appoint an MSC Flight Director for mission AS-203, further details have been worked out between the two Centers. The LH_2 Experiment Representative will be located next to the Flight Director; make all experiment decisions; execute them through the Flight Director; and have appeal rights to the Mission Director. Christensen has approved this concept in principle. Mr. Gordon Platt (P&VE-P) will be appointed the Flight Directors LH_2 representative. Preparations for this operation are nearly on schedule.

3. SA-10 LIEF Operation: The SA-10 terminal countdown was supported by some 50 MSFC and contractor personnel in the interim facility in COMP. There were 10 support requests from KSC requiring 18 conferences. Wind data, received from KSC, were evaluated and the results transmitted to the blockhouse. Telemetry and impact predictor data were displayed in Huntsville in real time. After insertion, Pegasus data were processed by the B-5500 computer and displayed on TV. The operation was generally successful. We expect to utilize the new HOSC facility for the 201 launch.

B 8/12

NOTES 8-9-65 STUHLINGER

1. PEGASUS C: Pegasus C continues to operate properly. We now have 9 valid hits in the 1.5 mil; 1 hit in the 8 mil; and 3 hits in the 16 mil thickness panels.

2. ATTITUDE OF PEGASUS C: Reference is made to your request on NOTES July 19-23, copy attached. It is not established at this time whether PEGASUS C behaves like A or B. However, in all cases the spin rate decreases with time. We will take this question up with Dr. Haeussermann as soon as we know the spinning mode and rate of PEGASUS C. Then we will try to make a prediction for the time of the rendezvous.

3. WOODS HOLE MEETING: Our previous concept of the AES Emplaced Scientific Station (ESS) was generally considered too modest, particularly in seismic experiments, and a more ambitious program of experiments should be developed. The Geophysics Group liked the ESS concept as extending the scientific possibilities over the Apollo Passive Package proposed by MSC for manned missions and felt that a central station with several remote auxiliary stations in an array pattern would be desirable for seismic studies.

1 Enc:

NOTES July 19-23

use correct format, please.

B 8/1

NOTES - STUHLINGER
July 19-23, 1965

X 38 12

1. AES EXPERIMENTS PLANNING: In reply to your question in Notes of 7-6-65, attached: In the referenced Headquarters meeting, MSF people objected to the Bellcomm plan and did not feel that it was appropriate to give all earth sciences and no hardware to MSFC. Taylor's option includes major hardware assignments to MSFC, which he called extravehicular activities. I assume that it is up to MSFC to define and claim the large assemblies for orbital operation as part of this, as presented to you in the July 14 briefing. This earlier meeting seems to be obsolete in light of last week's Executive Council Meeting. Your recent discussions with Dr. Mueller and the Executive Council have carried this much farther, especially since they now think of MSFC in connection with project definitions of lunar surface exploration, the earth orbital workshop, cryogenic propellant transfer in orbit, and other assignments.

E.S.

Please discuss consequences with Hausser-mann. (Rendez-vous with Pegasus C)

B

2. PEGASUS B: Total hit data on Pegasus B through July 22: .406 mm (16 mil) panels 31 hits; .203 mm (8 mil) panels 14 hits; and the .038 mm (1.5 mil) panels 66 hits. The rotational behavior of Pegasus B is entirely different than A: the rotation is still mainly about the original axis with a precession cone angle of 21° after 51 days. We are investigating this in terms of rigid body mechanics. Members of this lab have been invited to present Pegasus results at a NASA sponsored meteoroid symposium in Cambridge, Massachusetts in August.

3. WOODS HOLE MEETING: Feedback from the first week of the meeting on Lunar Surface Exploration: the scientists are in general agreement with our philosophy on lunar surface scientific mission. The scientific community seems to be impressed with the status of preparation and with the potential offered to scientific investigators.

4. LUNAR MISSION STUDIES: Upon Dr. Mueller's request, we sent copies of the interim Bendix report on the lunar mission studies to him and all members of his Science and Technology Advisory Committee (STAC).

1 Enc: Notes 7-6-65

NOTES 8/9/65 WILLIAMS

1. Re your question on the Wilson Committee in 7/26/65 NOTES, Ray Kline mentioned in the July Board meeting that Congressman Wilson would head up a congressional investigation on "NASA Planning." As you know we (NASA) have spent approximately $75M during the past 5 years on Advanced Studies, and Congress wants to know what we learned from that expenditure, and why we don't have a more positive plan for the future after spending that much money. You recall the congressional reaction to the "Smith Report," which was supposed to tell the President and Congress what NASA's plans for the future were. They (Congress in particular) were not happy - to put it politely. The committee has already asked for copies - through Headquarters - of all of the reports from past study contracts. It is too early to tell exactly how deep or how much digging the committee will go. Ray and/or I will keep you and the other senior people informed of the progress and activities of the committee.

2. AES Integration Contract. I have discussed the "AES Integration Contract" situation with Ed Gray several times during the past week. Things are still far from clear as to exactly how Headquarters plans to run it. I have pointed out to Ed the difficulties, particularly to MSFC, in proceeding the way it was described in his letter of 2 weeks ago. These items were also mentioned to Dr. Mueller last Thursday, and he acknowledged a need for a clearer understanding by Headquarters, MSFC and MSC before we proceed. As it stands now Davy Jones will be responsible for the Integration Study and Ed instructed me to wait until we hear from Davy before we do anything. This will probably result in a meeting at Headquarters sometimes during the next two weeks and we (Joe deFries and I) will be prepared to furnish an MSFC proposed action plan when the time comes. I will coordinate with Weidner, IO and Center management, prior to the meeting.

3. Saturn IB Polar Orbit Flight on SA 209. On August 4th, a meeting was held with representatives from MSC, and Dr. Knote from KSC, to discuss range safety requirements for Saturn IB polar orbit flight on SA 209. It was decided: (1) The mission trajectory would be reshaped to miss South America with a 3 sigma flight path and a 3 sigma dispersion in S-IVB drop; (2) MSC indicated that one experiment in this flight might require a rendezvous with Echo 1 and, as such, would require an 85° posigrade orbit instead of 90°. It was decided to disregard this for the present exercise; (3) Dr. Knote will arrange for a meeting with the Air Force range safety personnel about September 1, 1965.

1 Attachment
7/26/65 NOTES

B 8/3

NOTES 7/26/65 WILLIAMS

8/2

1. Action Items Resulting from Management Council Executive Session. As a result of the Management Council Executive Session and your discussion at the MSFC Board Meeting, the following actions will be taken:

a. Develop a plan for continuing the activities on the S-IVB Workshop. It is hoped that it can be presented to you in the Future Projects Policy Board meeting prior to your departure in mid-August. ✓ O.K. 10 August 1:30 - 5:30 B

b. Refine the manpower picture on AES for the next year. ✓

c. Wrap up what has been done on the 208/209 refueling experiment and file it. In view of the current feelings, it looks dead and no further action is planned. ✓

F.W. What's that? B

d. I will get in touch with Ed Gray on the Wilson Committee investigation on "NASA Planning". This could cause us a lot of trouble. ✓

2. AES Integration Contract. I learned last week from Davy Jones that the planned AES Integration Contract which was to be jointly run by MSFC/MSC starting in September/October has been dropped. Current thinking from Mueller/Jones is to have four contracts, two for MSFC and two for MSC, starting about January 1. These are to last about five months and accomplish the Program Definition Phase of AES integration. (After the contract is completed and evaluated, MSFC would, according to the plan, select an integration (hardware) contractor about August 1966). If it is done as they see it, MSFC will have a much greater task to do in (a) getting ready for the January 1 contract; (b) managing the program definition contract; and (c) getting in a position to select a hardware contractor about 12 months from now. ✓

Enc.

August 16, 1965

OFFICE OF DIRECTOR - MSFC

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION

REMARKS

This is to inform you that Dr. von Braun has read and initialed all of the August 16 and 23 NOTES; however, he did not make any comments to the NOTES. To eliminate the expense of reproduction, these initialed NOTES are not being reporduced and distributed. Your original NOTES are returned as attached.

CODE	NAME	DATE

MSFC - Form 495 (Rev August 1963)

B 8/17

NOTES 8-16-65 BELEW

J-2 ENGINE Qual I engine J-2032 is in the final stages of the post hot fire checkout. It is expected to be installed in test stand Delta-2A today.

The effect on engine delivery schedule, as a result of the oil contamination mentioned in previous notes, has been determined and reallocation of engines is in process to minimize stage impact.

A successful five second test was conducted with engine J-2013 at the MSFC Test Laboratory August 10. A 25 second test is scheduled to take place in two weeks.

Phase I, the feasibility study, of the J-2 test program at AEDC has been completed. A teletype to General Phillips, outlining the results of the feasibility study and requesting approval of Phase II for a September 1 go-ahead, will be brought to you for signature today or tomorrow.

F-1 ENGINE The two LOX transfer pumps which were damaged by fire at NASA/RETS (Edwards) have been repaired and are in checkout. No unusual situation was found on the overheated pump bearing believed to be responsible for the fire (details were covered in notes dated 8-2-65).

A GN_2 compressor piston ring failure in the final engine checkout station (after hot fire) at Rocketdyne has caused oil contamination of some F-1 and J-2 engines. Rocketdyne is investigating all pressurized gas facilities to see if a contamination potential exists elsewhere. Engines F-4018 and F-4019 (for S-IC-2) are being cleaned at Canoga Park. Engines F-4017 (for S-IC-2) and F-3014 (spare for S-IC-1) are contaminated and will be cleaned at MSFC. Earlier delivered engines are being inspected successively to insure that all contaminated engines are identified and cleaned.

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI The modified MSFC qual engine has successfully completed one mission duty cycle (650 seconds). Completion of hot-fire testing (three additional MDC or hot-fire testing to catastrophic failure) has been scheduled during the week of August 16.

RL10 ENGINE All indications are that the Centaur flight last Wednesday was completely successful. RL10 engines performed for 436.5 seconds as scheduled, the stage was rotated after payload separation, and residual propellants were exhausted through the engines (oxygen through the injector and hydrogen through the cooldown valves) to produce the retro-maneuver. (Retro-maneuver is accomplished to prevent the Surveyor star-seeker from inadvertently tracking the spent Centaur stage).

H-1 ENGINE Incentive Contract negotiations are in progress for procurement of 22 H-1 engines to complete Saturn IB requirements through Vehicle SA-212.

GENERAL Burden rates at Rocketdyne as well as at other aerospace contractors like Douglas and Aerojet will be increased due to the recent union negotiation on additional fringe benefits and the Medicare program. This will have a definite effect on the overall program budget (estimated to be 5% or more).

NOTES 8-16-65 CLINE

R 8/20

1. FAILURE OF TITANIUM TANKS OF N_2O_4: Within the last few weeks during qualification testing by Bell Aerosystems Company of the Apollo Command and Service Modules APS tanks (titanium), of eight tanks containing N_2O_4 at simulated service conditions, four tanks failed catastrophically and four developed leaks in periods of exposure of 34 to 90 hours. Bell's investigation to date indicates that failure is due to corrosion of titanium by N_2O_4. Additional studies are underway at Bell and at S&ID and at the Martin Company, which also uses these tanks. The problem is important to us because these tanks are planned for the S-IVB APS. The Materials Division is monitoring this situation closely and will initiate any required backup tests.

B
8/20

NOTES 8/16/65 CONSTAN

1. Visit of Col. Harold A. Gould

Col. Harold A. Gould, Technical Advisor of the House Science and Astronautic Committee, Washington, D. C. visited Michoud Assembly Facility on August 11, 1965. Col. Gould was accompanied by Messrs. Addison S. Bomberger, Facilities Standard Office NASA, Washington, D.C.;Gerald P. Gaffney, Staff Maintenance Engineer NASA, Washington, D.C,; Earl J. Kramer, Chief, General Support Projects Branch, Facilities and Design Office, MSFC; and Arthur V. Daly, Chief, Saturn V Facilities Branch, Facilities Project Office, MSFC.

This group was briefed regarding security, safety, plant maintenance, and construction.

2. Visit of Gen. C. Frank Schilz

Gen. C. Frank Schilz, accompanied by Mr. Raymond A. Kline of the Executive Staff, MSFC, visited Michoud Assembly Facility on August 12, 1965. Gen. Schilz was briefed on programs being performed at Michoud and given a plant tour.

3. Construction

A portion of the roof of the Vehicle Component Supply Building collapsed during a heavy rainstorm on Saturday, August 7, 1965, sometime between 1 and 1:30 p.m. Facilities and Design Office, MSFC, and the Michoud Facilities Office have been actively engaged in an investigation to determine the cause. Present opinion is that an excessive amount of water collected on the roof, exceeding the design load, and caused the failure. The final report of the survey team indicating possible causes for the collapse is expected during the week of August 15. It is anticipated that a schedule for repair to and completion of the building will be forwarded by the contractor next week.

NOTES/8-16-65/COOK

B 8/20

1. ESE CHECKOUT FACILITY REQUIREMENTS: Action is underway to implement decisions reached last week to provide additional facilities for ESE Checkout. In summary, these actions are:

a. Procurement action for trailers has been initiated.

b. An R&A Project for installation of a Butler building has been prepared and arrangements for erection made by TSO.

c. Three offices in Building 4371 have been made available on a temporary basis pending availability of the Butler building.

d. 4400 square feet of space in Building 4481 have been made available to GE.

2. R&D OPERATIONS AND INDUSTRIAL OPERATIONS: CHARTERS AND GUIDELINES FOR OPERATION: In an effort to provide better visibility of our in-depth technical support to IO and to reflect the latest philosophy of project, stage and subsystem management resulting from Dr. Mueller's recent visit, an updated matrix (Cook Book) is being prepared. This revised version will define R&D Operations role in subsystem management and will establish the in-depth support called out in Dr. von Braun's guidelines. This publication should also provide the proper medium to advise all concerned to Branch Chief level of the individuals within R&D Operations who have been assigned project-oriented responsibilities.

3. STATUS REVIEW OF S-II STAGE: In response to a request from S-II Stage Manager, IO, R-OM is coordinating the R&D Operations portion of a technical review of the S-II stage. This review is scheduled for Wednesday, August 18.

NOTES 8-16-65 DANNENBERG

R 8/20

1. Project Apollo Coordinate System Standards (SE 008-001-1) - The impact of implementing this standard within R&DO has been investigated. It appears that the system cannot be implemented before AS-206. For the Saturn V program it appears that the system should be implemented only for the computer software; however, this conclusion has not yet been reached and will be the subject of a meeting to be held soon.

2. Experiment Coordination

AES "Earth Orbital Mission Definition Document" - The preliminary version of the document prepared by IBM, Bethesda, for Headquarters has been reviewed. It summarizes the latest thinking on the AES missions and also defines the integrated payload packages for each of 15 vehicles.

Feasibility Implementation Study - Spacecraft, Inc., has made an interim report on Experiment MSFC #1 "Dielectric Materials Evaluation" and the Standard Payload Module. This report is the first result of a study for which R-P&VE is providing technical direction.

LEM Rack - Coordination of experiments for concept of carrying center engineering experiments was initiated. R-P&VE, R-ASTR, and R-AERO are cooperating to prepare a possible packaging scheme for presentation to the MSFEB meeting on 9-20-65.

Saturn V Scale Model Flight Test Project (previously the Little Joe II Project) - Dr. Mrazek and Dr. Geissler consider the proposed project necessary to assure the reliability of the Saturn V program.

A proposal covering justification, feasibility, schedule, and cost of the project in detail has been assembled by R-AERO with assistance from MSC-WSTF (White Sands Test Facility), and has been forwarded to R-DIR and I-V-MGR. Funds for this proposal ($3 mill for 1 flight, $5.5 mill for 2 flights, or $7.5 mill for 3 flights) are being sought through R&DO and IO budget channels.

Request for R&DO Study on Payload Of Opportunity for SA-210 - A request for a payload of approximately 9500 pounds has come from I-SC-MGR to replace the Cislunar Pegasus payload originally scheduled for this flight (March 1968). The trajectory of SA-210 will utilize the 2-burn capability of Centaur in order to provide R&DO data for future Voyager flights. Further study must be made by R-AERO for any specific trajectory.

NOTES 8/16/65 GEISSLER

R 8/20

1. Saturn IB Retro-Rocket Plume Impingement: DAC and MSFC analyses show that exhaust plumes of S-IB retro-rockets impinge upon S-IVB/S-IB interstage and aft portion of S-IVB during separation, resulting in local high pressure regions on the vehicle's surface. DAC analyses show the impingement normal force to be about 8700 lbs per retro-rocket. We are checking this figure. Two problems result from this force: (a) If one retro-rocket fails, the unsymmetrical pressure will induce a turning moment to the S-IB stage, rotating the S-IB stage and S-IB/S-IVB interstage, and causing a collision of the interstage and the J-2 engine bell; (b) Plume impingements may also result in a crushing force on the interstage, the structure of which may require beef-up. These problems will be discussed at the S-IVB Dynamics and Control Working Group Meeting at Douglas next week.

2. High Reynolds Number Facility: On June 2, 1965 a presentation on our proposed High Reynolds Number Facility was given to Mr. Lilly at NASA HQ. The proposal has drawn objections from OART, calling such testing unnecessary, and stopping an initially favorable reaction. The objectors are not familiar with our arguments, and judge on the basis of airplane conditions, which do not apply to rockets. This point was made clear to Mr. Lilly during the reclama meeting at MSFC on August 9, 1965. We will put our arguments in writing, including supporting technical material. Mr. Lilly suggested that a subsequent discussion with Dr. Eggers, et al., OART, may then be scheduled at MSFC. It appears evident that OART is not sufficiently aware of the specific aerodynamic problems of large, manned rockets; we should use this opportunity to bring our points to their attention.

3. AES Mission Planning: A representative of Aero-Astrodynamics Laboratory attended subject meeting conducted by Headquarters and MSC on August 10, 1965. The following facts were learned at the meeting: (1) SA-208 and 209 were approved for Apollo crew training rendezvous mission; (2) Mr. Webb and Dr. Seamans have evidently assigned AES to OMSF; (3) A letter outlining each Center's responsibilities for AES is forthcoming; (4) A polar orbit is no longer assigned to SA-209. Headquarters is to notify us August 16 whether another vehicle will be assigned to this mission; (5) Next mission planning meeting to be held in Houston September 8; (6) Phase I AES mission planning to be completed by December 31, 1965. Phase I includes SA-211, SA-507 and SA-509.

NOTES 8-16-65 GRAU

B 8/21

T

1. S-IVB AUTOMATION: The August 8 long duration firing of S-IVB 201 was the first successful static firing of a stage which was fully, automatically controlled by a computer. The successful firing reflects the adequacy of the computer controlled GSE to correctly stimulate and monitor the stage functions during firing operations.

Lee James

2. DAC COMPUTER FACILITIES: A meeting was held at this Laboratory to discuss the Douglas request for support computer facilities at both Huntington Beach and SACTO. The meeting was primarily an Automation Sub-Board 4 meeting with DAC management attending. The meeting resulted in a recommendation from the Sub-Board to the S-IVB Stage Manager to authorize one 924-A computer and associated equipment for SACTO only.

Col. Yarkin

3. NAA/S&ID QUALITY SURVEY: A survey of the NAA/S&ID quality operations was conducted during the week of July 26 through August 6, 1965. In general the quality program looked good. Certain areas, such as calibration of equipment, were excellent. The area of conformal coating of PC boards was probably the worst condition found. The entire operation needs revising. S&ID agreed to look into this area immediately and make the necessary changes.

Lee James. We'd better look into this. It sounds to me really alarming with regard to 201. Do we have the same pressure switches in 201 all the way thru? I think there is still time for a reliability testing program and correction. I suggest you get a copy of this analysis!

E. Rees

8/21

NOTES 8/16/65 HAEUSSERMANN

B 8/21

1. APOLLO-SATURN RELIABILITY AND BACKUP STUDIES: (Reference your comment to Item 1 of 8/9 Notes - copy attached*). This matter has been discussed with MSC a number of times with no real conclusion reached. We intend to document the subject and present it to the G&C Implementation Sub-Panel in the near future with a recommendation that we make a joint written summation to Headquarters. We will ask that this summation include a detailed description of the two distinctly different philosophies used in the reliability assessments and the resulting applications of redundancy. In addition, at the first opportunity verbal information will be provided Dr. Mueller and General Phillips.

W.H. Brown would like to have a copy of our document. 2. Rees

2. PRELIMINARY LOOK AT SA-10 INSTRUMENTATION: (Reference your comment to Item 3 of 8/9 Notes - copy attached*). Evaluation of data is being accelerated to provide Dr. Mueller with factual information as soon as possible. Evaluation is expected to be completed by 8/23.

*Copies to DIR and R-DIR only.

NOTES 8/16/65 HEIMBURG

R 8/21

1. S-IVB (MSFC)

Test S-IVB-002 was performed at the S-IVB Test Stand (MSFC) for a scheduled duration of 9 seconds. All systems performed as expected. The turbopump machinery and GG of J-2 engine J-2013 was inspected by Rocketdyne. The turbopump machinery was found to be in excellent condition. The GG fuel injector showed some separation, but can be fired by redlining the GG combustor body temperature. Next firing is scheduled for Wednesday, 8/18.

2. S-II BATTLESHIP (S&ID)

104 seconds of a planned 160-second duration firing was performed on the S-II battleship on 8/12, which included a P.U. excursion to the maximum and minimum limits. At 50 seconds, a fire was detected on engine 5 which was extinguished by GN_2 purge. Later, other fires were noticed which could not be extinguished, so manual cutoff was given. Some wiring damage resulted from the fires.

3. SOUND SUPPRESSION (5X30K CLUSTER)

Completed testing on the suppressor with three firings performed on 8/10, 8/11, and 8/12. Plans are now to remove the suppressor for baseline noise measurement.

4. S-IVB (DAC)

Stage 201 underwent a successful 450-second firing on 8/8 at Sacramento. Buyoff meeting is set for 8/16. Generally things look good.

Saturn V/IVB battleship firing was cancelled on 8/12, when LH_2 leaks were detected at the prevalve. on 8/13, a second attempt was aborted at approximately 10 seconds, due to a fire indication above the engine. The fire was small and appeared to be confined to some control wiring above the engine deck. DAC has two firings to make before cutoff date of program on 8/31.

5. F-1 ENGINE

Tests FW-006 through FW-009 were conducted on the West Area F-1 Test Stand with F-1 engine 2009 for durations of 36, 64, 8, and 144 seconds, respectively. Primary purpose of these tests was to evaluate the high strength (gold plated) injector. Post-test inspection after test FW-009 revealed no apparent damage to the injector. Next firing forecast, Tuesday, 8/17, at 4:45 p.m.

6. S-IC

Post-test inspection revealed a cracked injector on engine S/N 2010 at engine position 2. The injector will be replaced. Hardware changes are in process for updating the stage to the automatic configuration. Installation of the automatic GSE is in process.

NOTES 8-16-65 HOELZER

1. VISIT BY NASA HEADQUARTERS PERSONNEL: Captain Kahao, Mr. Costantino, Mr. O'Rourke, NASA Headquarters, and Mr. John Garrity, McKinsey and Company, Inc. (Management Consultants) visited here on August 12, 1965, to discuss the Automatic Data Processing Workload Control. Mr. O. C. Jean and Mr. Fred Jandebeur attended the meeting and were very helpful in presenting the Computation Customer's view of the current ADP Workload Control System. We feel that Captain Kahao left with the conviction that the controls were adequate and the best that could reasonably be expected.

2. STATUS OF THIRD GENERATION PROCUREMENT:

The Specifications for Third Generation Computing Equipment at MSFC, Slidell, and MSFC, Huntsville, have been combined in a single procurement package and forwarded to Purchasing.

It is anticipated that the Procurement Plan will be submitted to Headquarters the week of August 23, 1965, with issuance of the RFP occurring on or about September 17, 1965. A contract award is estimated for March 1, 1966.

3. DECENTRALIZED COMPUTER: Installation of the electrical cables and preparation of the site are now in progress for CDC 3200 digital computer in support of Aero-Astrodynamics Laboratory, Building 4200, with expected delivery of the computer August 16, 1965. This computer replaces the GE 225.

NOTES 8/16/65 JAMES

8/21

S-IB-1: The booster arrived at KSC on Saturday, August 14.

S-IVB-201: Modifications and cleanup operations are continuing. We still plan to ship on September 3, 1965, by commercial ship. Static firing data evaluated to date indicated satisfactory performance of all systems.

I.U. 201: Assembly has not been completed due to requirement for late E.O.'s to be installed. We are evaluating all changes very closely to insure that they are in fact mandatory prior to approval. We met with IBM, Owego, last week to discuss problems associated with their electrical fabrication. As a result of these problems, Quality had stopped production. Specific action items were defined which will permit IBM to continue production on 201 hardware.

LAUNCH COMPLEX 34 ESE: It appears that we can meet the August 25 date for completion of the delivery of this hardware to KSC. This revised delivery date has been transmitted to KSC and it will support the current launch month.

NOTES 8-16-65 KUERS

R 8/21

1. Manufacturing Support of ME Laboratory to Saturn Program:

It is my impression that the extent of actual support of in-house manufacturing is not sufficiently known by our program management and that the reasons for accepting such work are sometimes not correctly understood. To illustrate this statement, I am quoting a few typical examples of such manufacturing support:

For the IU: ME Laboratory has built 7 electrical distributors for 201; manufactured and/or modified many components, fabricated a great number of tubing and cleaned components, tubing and ground support equipment.

For Engines: A great number of tubes and ducts is currently cleaned in our facilities after detection of contamination at receipt.

For MTF: ME Laboratory is giving support to Test Laboratory for cleaning of S-II Test Stand components.

For S-IC: Sixteen upper link assemblies for Swing Arms are being machined on our numerical controlled milling machine and six lox tunnels have been reworked by our magnetomotive shrinking process for support of stages being built by Boeing/Michoud. These are just a few typical examples. Many others could be added. All this effort certainly contributes to meet important program milestones and improves the quality of hardware and is, therefore, in the best interest of the program. In order to improve the control over these efforts, I will in the future, whenever possible, ask for written work requests from IO.

NOTES 8/16/65 MAUS

B 8/21

1. BOB VISIT - Don Crabill, Bureau of the Budget, made his annual visit to KSC in July. He will visit Marshall September 23 - October 1, (dates are tentative) to review the Center's plans and programs and anticipated budget requirements for FY-67. Bob Sparks coordinated the preparation for this visit last year and has been named as Project Officer for this visit. We are preparing guidelines for the visit and information on probably discussion points.

2. HEADQUARTERS SATURN/APOLLO APPLICATIONS OFFICE - Mr. Webb signed the charter for the MSF Saturn/Apollo Applications Office on August 6. This office will have program management responsibility for the Saturn IB/Centaur and AES Programs. The key people designated to date are:

   David M. Jones, Director (acting)
   John H. Disher, Deputy Director
   William B. Taylor, Director, AES
   Harold G. Russell, Director, Saturn IB/Centaur
   Lester K. Fero, Deputy Director, Saturn IB/Centaur
   J. Pemble Field, Director, Program Control

3. POP 65-3 REVIEW- The MSF R&D POP 65-3 review team, headed by Chuck Koenig, will be at Marshall August 17 to 19. General Phillips will attend the final day of review.

4. MSFC PROCEDURE ON ORGANIZATION - Mr. Gorman has signed the new MSFC Organization Policy and Control Procedure, and it will be distributed later this week.

5. PERT AND COMPANION COST SYSTEM - The 8th PERT and Companion Cost System coordination meeting is to be held in Washington September 20-21. We are coordinating arrangements for brief MSFC presentations on:

   - MSFC efforts regarding the integration of companion cost and PERT into a single management system;
   - status report on MSFC Pilot Testing of MSC's and LeRC's PERT Summarization Computer Programs: and
   - summary of local practices and procedures involving contractural coverage of PERT, NASA PERT and Companion Cost, and Cost Reporting.

6. AES PLANNING PACKAGE - Planning guidelines were received last week from Davy Jones, MSF, for program definition phase of AES. Attached is a brief summary of the highlights.

ATTACHMENT TO

NOTES 8/16/65 MAUS

R 8/21

AES PLANNING PACKAGE

We received a package of planning guidelines from MSF (Davy Jones) to be used in proceeding with the program definition phase of AES. The Center was requested to review and comment on these guidelines by August 23 and to submit by October 1 a plan for implementing AES program definition in accordance with the guidelines. The guidelines provide for payload integration activity building up to approximately four AES missions per year each for MSC and MSFC by 1970-1971. MSFC is responsible for the integration of 12 flights (2 Saturn IB's and 10 Saturn V's) consisting of six lunar surface (3 LEM Shelter and 3 LEM Taxi) and six earth orbital flights. MSC is responsible for integration of the other 17 AES flights (11 Saturn IB's and 6 Saturn V's) consisting of three lunar orbit and 14 earth orbital flights. For AES experiment development assignments the guidelines assigned Extravehicular Engineering Activities, and Lunar Surface Mobility/Mission Support to MSFC, and Biomedicine/Behavior, and Operations Techniques and Advanced Mission Spacecraft Subsystems to MSC. The present flight mission assignment does not show any unassigned launch vehicles. The 6 x 6 x 8 production rate is fully utilized between the AES and Saturn IB/ Centaur Programs.

NOTES 8/16/65 REINARTZ

R 8/21

SATURN IB/CENTAUR PROGRAM REVIEW: The Saturn IB/Centaur Program Review, held in Washington, August 12, was attended by General O'Connor, myself; General Jones, Colonel Russell, OMSF; Mr. Ginter, Mr. Hearth, OSSA; and Mr. Nettles, LeRC. The result of the meeting primarily brought to everyone's attention the problems that are being encountered on the technical decisions or agreements. I am going to prepare a letter to Colonel Russell stating for the record the problems, our plans for proceeding, or the reasons why we are proceeding in this manner.

GENERAL DYNAMICS/CONVAIR STUDY CONTRACT: We are having the first review of the GD/C study at San Diego on August 25-26.

B 8/21

NOTES 8/16/65 RUDOLPH

1. MSFC Meeting Policy - My Notes 8/2/65 (Item 1, copy attached) expressed concern of a continuing major problem of Center meeting schedule conflicts. Again, this week we are confronted with this problem. Your Policy Memorandum of June 11, 1965, clearly states that "no major Center-level meetings or visits will be held on or scheduled for Monday of each week". Based on this Policy, Saturn V Program Office Staff Meetings are scheduled each Monday afternoon (following the regular Monday morning, IO Staff Meeting). In direct conflict with your Policy, Center level meetings scheduled for Monday appear to be the rule rather than the exception. Example - MSFC "dry run" for Panel Review Board Meeting 65-4, scheduled for today, August 16, 1965 at 2 pm.

2. S-IC-1 Stage Status - Delivery to R-QUAL is expected on Monday, Sept 27, 1965, as scheduled.

MATT URLAUB. We should look for a principle replacement on this. 2 Nov

3. S-IC-2 Stage Status - The Fuel Tank exclusion riser segments fractured and the cover fabric split during hydrostatic testing. Repairs have been completed and no schedule delay will result.

4. S-II Battleship Stage:

The S-II Battleship was successfully fired on Monday, August 9, 1965, for full duration. The cut-off was from fuel depletion as planned at approximately 392 seconds. All test objectives were accomplished.

The S-II Battleship was fired on Thursday, August 12, 1965, for 107 seconds duration. Planned duration was 150 seconds. Premature manual cut-off was due to fire on engines 2, 3, and 5. Cause of fire not yet determined.

Attachment: Notes 8/2/65 Rudolph (DIR, I-DIR and R-DIR's copy only)

Arthur Rudolph: I suffer with you on this issue, but due to Webb's visit and many other unforeseen engagements there was just no other possibility. Once-in-a-while, I hope only rarely, we will have to violate our ruling of June 11, 65. E. Rees 8/21

WEEKLY NOTES SPEER 8/16/65

R 8/21

1. Orbital Tests on AS-203: Various tests are presently being considered on AS-203 for gaining experience in flight control: (1) Utilization of rate gyros for backup attitude control in orbit; (2) inflight checkout of digital command system; and (3) utilization of onboard digital computer to evaluate residual consumables (e.g. GN_2). All tests would be on non-interference basis with LH_2 experiment.

2. MSFC Plan for Apollo Mission Operations: The first draft of subject plan requested by Gen. Phillips was submitted on schedule. MSF reaction (Holcomb) has been favorable. The plan is now being reviewed in more detail by all elements of MSFC and will be revised as required. The functions of the new Mission Operations Office are considered in the plan.

3. OSRO: Mr. W. Hynes (COMP; GS-14) has been appointed as the MSFC representative for the Operations Support Requirements Office (OSRO). The present OSRO activities are focused on Gemini; however, they are critical to MSFC because all procedures and formats being developed now will be applied to Apollo. OSRO is still struggling with major problems such as the unresolved interface between NASA and DOD on range support and the conflict between KSC and GSFC concerning the implementation responsibility during the time between liftoff and orbit insertion.

Dr. Speer, I would like to see copy of the final version.

E. Rees

NOTES 8-15-65 Stuhlinger

1. PEGASUS C: Pegasus C satellite continues to operate properly. There are now 21 valid meteoroid hits in the 1.5 mil, 3 in the 8 mil and 7 in the 16 mil detectors. Three panels have become shorted, all presumably due to meteoroid impacts. All three panels have been inactivated by blowing their fuses.

Green Mountain tracking was suspended on Pegasus A and B when C was launched, and the GSFC tracking network will be relied on for these data. This action was necessary because of the excessive work-load imposed on the Green Mountain station personnel and the Computation Laboratory personnel.

Dr. Whipple, Dr. Dozier and Mr. Naumann attended the Meteor Symposium at the Smithsonian Observatory this week where Pegasus results were presented by Mr. Naumann.

2. TOTAL FY-65 ART/SRT STATUS:

	Plan Authorized	Processed To FMO	Obligated	Not Committed
OART	15,221,000	14,884,697	14,106,408	336,303
MSF	20,670,000	20,384,409	20,200,083	285,591
OSSA	1,463,000	1,410,560	1,410,560	52,440
OTDA	2,000,000	1,960,123	1,753,366	39,877
TOTALS	39,354,000	38,639,789	37,470,417	714,211

NOTES 8/16/65 Williams

B 8/21

1. Nuclear Rocket Program. A meeting will be held with Harry Finger in Washington today (8/16) to review MSFC's proposal to support the Nuclear Rocket Program. This is a modification of the material presented at the FPPB meeting (8/10), as per the Board's directives. The revisions have been reviewed with Mr. Weidner. Mr. Tessman, Jordan and I will be the MSFC participants at the meeting.

2. AES Planning. MSFC has received a rather detailed "package" from Mueller/Jones on AES planning and requested: (1) Our comments on the material by 8/23; (2) specific data on MSFC's plans, manpower and budget data at later dates. We will pull together a set of comments and would like to review them with Mr. Weidner and you (Dr. Rees), prior to the August Management Council Meeting.

3. A first analysis of the outcome of the Woods Hole Summer Conference and the impact of the AES Lunar Surface activities are:

I. Lunar Scientific Survey Module

1. Remote control is desired and is used, both before the astronaut's arrival, as well as after their departure. This request impacts the design by requiring a radiosotope power supply and a direct link communication system.

2. Radius of action increase from the present 8 km to approximately 15 km has been recommended. The impact of such desire is that unless the LSSM speed is increased considerably, either a second "back-pack" is required or the LSSM must be outfitted with a small environmentally controlled cabin.

3. Time on site should be a minimum of 2 to 3 hours, excluding travel time of the LSSM. This again requires an increase in the capability of an environment control system for the LSSM.

4. Automatic Position Recording System should determine the position of the astronaut to 1 part in 1,000. A navigation system, using more than dead reckoning techniques, must be incorporated.

5. A payload of one or two men, plus 600#, should be provided. This would require a small modification in the design to furnish seating requirements for two astronauts along with the scientific payload.

II. Manned Flying System

A payload of 300 lb is required and is provided by the system.

III. DRILL

The panels did not strongly endorse the 100 foot drill. A definite requirement was voiced for 10 - 20 foot drills to be used in conjunction with a LSSM or a single 1,000-foot drill.

IV. Emplaced Scientific Station

1. Modular designs should be required of any ESS concept so that the impact of a previous flight can be incorporated into the following flight.

2. Large Emplaced Stations in the order of 1,000 lb were recommended for use with the LSSM. These would consist of 3 satellite modules with one central station spread over an 8 km radius.

V. LEM/T and CSM

1. A sample return capability for the LEM/T of 500 lb was requested. This doubles the present estimates of the capability.

2. Astronaut activities in the orbiting CSM, while the lunar mission is in progress, were discussed and need to be defined.

Frank William: Are these remarks out of the Woods Hole Camp (off the-cuff) first suggestions by individual members of the "Scientific Community" or are they guidelines which will be cast in concrete?

E. Rees
8/21

August 23, 1965

OFFICE OF DIRECTOR – MSFC

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION

REMARKS

This is to inform you that Dr. von Braun has read and initialed all of the August 16 and 23 NOTES; however, he did not make any comments to the NOTES. To eliminate the expense of reproduction, these initialed NOTES are not being reporduced and distributed. Your original NOTES are returned as attached.

CODE	NAME	DATE

MSFC - Form 495 (Rev August 1963)

3 9/25

NOTES 8/23/65 BALCH

1. Mr. Webb and his party visited the MTF last Wednesday and were given a tour. ✓

2. Negotiations are expected to begin with GE next Monday on the revised FY 66 work package. ✓

NOTES 8-23-65 BELEW

F-1 ENGINE During gas generator oscillations evaluation on F-1 R&D engine 020-2, a turbine manifold failure occurred. Preliminary indications are that failure was due to "old age" as the manifold had a total of 94 tests, 8,038 seconds of component and engine testing, and had been subjected to 17 gas generator oscillation tests.

LOX is now being pumped into the new 2,500 ton storage tank at NASA/RETS, Edwards Air Force Base, California. After fire damage, the LOX transfer system at NASA/RETS is back to normal with no impact on F-1 engine testing.

There is a temporary shortage of LN_2 on the West Coast, caused by LN_2 producers not meeting contract commitments, the breakdown of two LH_2 plants, and the shift to LN_2 for cryogenic tank testing on S-II hardware at Santa Susana. Relief will be obtained to a small degree by shift of 390 tons of surplus LN_2 from the completed mechanical checkout of pad #34 at Kennedy Space Center. The Air Force at Middletown is taking action to alleviate the LN_2 shortage. So far, an estimated 12 thrust chamber/injector tests and 6 engine system tests could not be performed and activity at RETS/EAFB will be curtailed until this shortage is alleviated.

Reference the previously reported GN_2/oil engine contamination. Four F-1 engines were contaminated (2 at Rocketdyne, 2 at MSFC). The contaminated components are being cleaned on-site to avoid transportation delays. ME Lab gave full cooperation in establishing workaround schedules to preclude stage schedule impact. Workaround at Rocketdyne will slip one or two engine deliveries in August with on-schedule deliveries predicted by September 30; no vehicle impact is anticipated.

J-2 ENGINE Engine J-2013 was successfully tested for 25 seconds at the Marshall Test Laboratory on August 18.

FRT deficiencies have been defined and penalty runs on the affected components are underway. These deficiencies will be resolved prior to the initiation of the engine qualification test series.

General Phillips gave his approval to Phase II testing at AEDC (Tullahoma) during his visit on Thursday. The program should be underway by September 1.

A successful start, hold and restart test was conducted on the S-IVB Battleship at DAC/SACTO last Tuesday.

S-IVB ULLAGE ENGINES - ROCKETDYNE/GEMINI On August 17, the modified MSFC engine completed four mission duty cycles (2,821 seconds total on-time) of hot fire testing, thus successfully completing the MSFC Qualification Program.

RL10 ENGINE Negotiations start today on the two-year follow-on incentive contract for RL10 Engine Development. This contract covers qualification of the RL10A3-3 (uprated Isp version) engine in October 1966, and vehicle flight support through September 1967.

NOTES 8-23-65 CLINE

1. S-IVB/V BATTLESHIP RESTART TEST CONDUCTED ON 8-17-65: The first burn was 168 seconds with a 3-second fuel lead, followed by a hold simulating a 4 1/2 hour orbital coast period. After a 4-second fuel lead, the engine restarted and burned approximately 320 seconds during which a 289.5 second gimbal test was conducted. The cutoff was manual, as planned, and based on a fuel level indication of approximately one percent.

NOTES 8/23/65 CONSTAN

1. Visit of NASA Administrator

Mr. James Webb and party visited Michoud Assembly Facility on August 18, 1965. A briefing and tour of the plant was conducted by Dr. Constan, Mr. Douglas Lowrey and Mr. Richard Nelson. At the conclusion of the visit the party left for Mississippi Test Facility. The party consisted of -

Mr. James Webb	
Mr. James Webb, Jr.	
Dr. Arthur Raymond	- NASA Consultant
Gen. Charles Cabell, Ret.	- NASA Consultant
Dr. Stark Draper	- NASA Consultant
Mr. Gifford Johnson	- NASA Consultant
Col. John Glenn	- NASA Consultant
Gen. James McCormack	- Vice President of Massachusetts Institute of Technology
Mr. John D. Young	- Dep. Assoc. Adm., NASA
Mr. Brian Duff	- Public Affairs, NASA Headquarters
Mr. Harry Gorman	- MSFC
Gen. Edmund O'Connor	- MSFC
Capt. Bart. Slattery	- MSFC

2. Vehicle Status - CCSD

S-IB-1 - At Cape Kennedy
S-IB-2 - Post-static modifications being performed
S-IB-3 - Pre-Static checkout complete
S-IB-4 - Final assembly in advanced state
S-IB-5 - LOX tank clustering complete

3. Vehicle Status - Boeing

S-IC-D - In final assembly. Scheduled to move to checkout August 26, 1965
S-IC-F - Structural assembly nearly complete in VAB. Move to horizontal installation position scheduled for August 24, 1965
S-IC-3 - Major structural subassemblies in work and on schedule

NOTES/8-23-65/COOK

1. S-II TECHNICAL BRIEFING TO DR. REES: The in-depth technical review of the S-II stage conducted by IO on August 18 is a good example of the manner in which R&DO supports IO in accordance with Dr. von Braun's Guidelines. The requirement for R&DO participation was placed on R-OM by IO. The Vehicle Support Group of R-OM, working with the laboratories concerned, established the agenda and coordinated R&D Operations' position. The description of technical problem areas and the solution or proposed action were presented by Laboratory Stage Engineering Managers who were supported by Engineers having subsystem responsibility and by technical personnel specializing in the functional areas concerned. The P&VE and AERO portions of the review have been completed. The ASTR, QUAL, TEST, and ME portions are scheduled for review and completion this week. Dr. Mrazek suggested that the S-IVB be examined in a similar manner.

2. LITTLE JOE: R-OM is coordinating a study to determine the feasibility of adapting two Little Joe vehicles to a 40% Saturn V scale. This proposal provides for firing these vehicles at White Sands Missile Range to obtain needed unsteady aerodynamics information applicable to Saturn V. AERO prepared a proposal covering technical and program requirements which was presented to Dr. Rees and other members of the Center Staff on August 19. The proposal is being further refined and will be finalized for further review by Dr. Rees on August 27.

3. FINANCIAL MANAGEMENT AND PERSONNEL REPORTING UNDER SINGLE SUPPORT CONTRACTS: In the 7-19-65 NOTES, the proposed action to improve, consolidate, and simplify the management reporting system under the Single Support Contracts was outlined. To date, our proposed action to transmit the basic information of funding and manpower by a card punch media is progressing satisfactorily. The basic approach for computer application has been developed by Computation Laboratory. The details have been coordinated with Financial Management Office and Purchasing who have each given complete support. The first meeting has been held with the contractors in which the system was explained and their cooperation requested. The laboratories will be briefed this week which should complete the foundation for the program.

NOTES 8-23-65 DANNENBERG

1. Experiments Coordination - The Experiments Coordination Office has forwarded eight experiment proposals (NASA Form 1067) to the Executive Secretary of the MSFEB. With the five experiments that were passed out during the July meeting, MSFC will have 13 experiments to present to the MSFEB for consideration, as well as the results of a feasibility and impact study of three experiments which were approved in May, 1965. The new experiments which will be presented to the MSFEB are as follows:

MSFC # 5 - Boiling Heat Transfer	P&VE-PT
MSFC # 6 - Cryogenic Propellant Trans.	P&VE-PT
MSFC # 7 - Super Insulation	P&VE-PT
MSFC # 8 - Mechanical Properties	P&VE-M
MSFC # 9 - Lubrication	P&VE-M
MSFC # 10 - Contact Conductance	RP-T
MSFC # 11 - Hydrostatic Gas Bearing	ASTR-GC
MSFC # 12 - Radar Return Charact.	ASTR-IRT
MSFC # 13 - Antenna Patterning	ASTR-IRA
MSFC # 14 - Tracking & Navigation (AROD)	ASTR-I
MSFC # 15 - Precision Optical Sys.	ASTR-RP
MSFC # 16 - Optical Guidance Sys.	ASTR-RP
MSFC # 17 - Assembly Tool	ME-M

2. ICD Management - The ICD reviews conducted at KSC on 8-10/11-65 revealed that most ICDs are complete. APS (Auxiliary Propulsion System) and EDS (Environmental Control System) changes are scheduled for completion at an early date but probably after September 1, 1965. All other changes will meet this date.

3. Configuration Management - The IBM proposal for Configuration Management was reviewed in detail by IO stage representatives and R&DO. As a result of the review it was agreed that the plan was not acceptable and that MSEC should develop a plan and present to IBM as a requirements document.

Critique of the Configuration Management training course was held with GE, IO, and PER-T. GE will update and correct material prior to next course commencing on 8-30-65.

NOTES 8/23/65 GEISSLER

1. AES Mission Plans: From headquarters we've learned that primary mission plans for AES SA-211 are to be defined by Sept. 1. If LEM is available, it will probably be an "all systems up" qualification flight for the lunar survey equipment. If LEM is unavailable, it could be an earth orbital survey and mapping mission from a polar orbit. If the earth mapping mission is not scheduled for SA-211, it will probably be added to a later flight. Headquarters is soliciting suggestions for experiments on SA-507, a retrograde sun synchronous orbit. Our counterparts at MSC have been informed of the above information.

2. Pre-Launch Wind Monitoring: On August 18 we received the equations proposed by MSC to be included for the structural assessment of the spacecraft in the pre-launch wind monitoring program. Programming will start as soon as these equations can be incorporated into the basic program flow. We will probably use the B5500 computer as primary because of its graphical output capabilities with the 7094 as a backup.

3. S-II Technical Problem Meeting (Aug. 18-19, 1965): At subject meeting it was stated by P&VE representatives that no max heating trajectory for Saturn V is available. It is pointed out that a "Design Aerodynamic Heat Transfer Trajectory" is available and is contained in the S-II CEI Specification, now awaiting I.O. approval. This trajectory has been agreed to by both the Aero. Lab. and NAA/S&ID as the design criteria. Since the trajectory in the CEI spec. is based upon an old definition ($\sim$1963) of the Saturn V configuration, a new trajectory based upon the current configuration and a nominal orbital injection altitude of 160 km has been transmitted to I.O. as design information to be reviewed by NAA/S&ID to determine if there will be an impact on the S-II program. Based upon discussions with S&ID, it is anticipated that the environment of the revised trajectory will be less severe than that of the CEI spec. trajectory and thus no design changes to the S-II will be imposed due to aerodynamic heating.

NOTES 8-23-65 GRAU

1. S-IC QUALITY GSE CHECKOUT: Boeing's performance on installation of CAM's during the past week resulted in functional incorporation of all planned CAM's and power is back on the GSE. The CAM picture looks better than it ever has. We should be over the hump on this problem.

2. S-IVB STAGE 201: The 201 stage is located at Beta III Test Tower at Sacramento undergoing Poststatic Checkout after successful static firing. The EMC Integrated System Test, Hydraulic Checks, Leak Checks, and TM Subsystem Tests have been completed at this time.

3. FACI: The informal First Article Configuration Inspection (FACI) for S-IVB stage 201 was conducted at DAC/Huntington Beach during the period August 3-13, 1965. The primary purpose of this FACI was announced as training in preparation for the formal FACI requirements of NPC 500-1. It was agreed that no attempt would be made to establish or confirm the configuration baseline for stage 201 Contract End Item. The FACI resulted in a total of 39 discrepancies being determined and reported. Copies of these discrepancies are being forwarded to DAC through established channels. Operational plans are in preparation for preliminary FACI's of S-IC-1 and 201-IU. The 201-IU FACI is scheduled for mid-September.

NOTES 8/23/65 HAEUSSERMANN

1. S-IU-500FS: Ground Equipment Test Set (GETS) test should have started 8/11/65; however, because of non-availability of Electrical Support Equipment from GE, the test has not started. The assembly of the GETS is not complete; cables have not been routed and some panels are not available. Exact date of test start is uncertain; situation is under continuous assessment. One to fourteen days delay of GETS test could be made up by overtime, shift work, etc. If GETS test starts later than 8/25, a delay of test start at DAC can be expected.

NOTES 8/23/65 HEIMBURG

1. F-1 ENGINE

Tests FW-010 through FW-012 were conducted on the West Area F-1 Test Stand with F-1 engine F-2009 for durations of 58, 59, and 145 (approximate) seconds, respectively. This brings the total mainstage time to 514 seconds with 7 starts, and no visual damage to the high strength (gold-plated) injector. F-1 engine S/N F-3T1 (501 configuration) was installed on the Static Test Tower West for calibration tests prior to installation on S-IC-T.

2. S-IC

Engines at positions 1 and 2 were removed from the stage. The engine at position 5 will be removed later and installed in position 2, together with the Arrowhead lox PVC. Engines F3-T1 (501 configuration) and F4-T2 (502 configuration) will be installed in positions 5 and 1, respectively.

3. S-IVB (MSFC)

Test S-IVB-003 was successfully conducted for 26 seconds on 8/18. Review of test data indicated that the GG has become too marginal (burn-out problem) for another test. Rocketdyne will expedite a spare fuel turbopump (easiest way to change GG), which will be installed on the engine next week.

4. S-IVB BATTLESHIP (SACTO)

Two successful Saturn V/S-IV duration firings were made last week. The first test was accomplished on 8/17. First burn was approximately 170 seconds, followed by a simulated three orbit coast period. The second burn duration was approximately 320 seconds with a full gimbal program.

The second full duration test was accomplished Friday, 8/20. The first burn was a 17-second duration test, followed by a simulated one orbit hold and a 360-second second burn. This completes the S-IVB battleship testing at Sacramento.

5. S-II BATTLESHIP (SANTA SUSANA)

A 150-second test scheduled for Thursday, 8/19, was abandoned Wednesday when interference occurred with common bulkhead testing. Battleship is now closed down for inclusion of flight-type engines, recirculation systems, prevalves, etc. Next firing is anticipated by S&ID on 11/19/65, with rebuilt system. This anticipated November firing would very roughly correspond to 7/29/65 firing of S-IC-T.

NOTES 8-23-65 HOELZER

B5500 UPGRADING: Modification and upgrading of the Burroughs B-5500 Digital Computer is currently being performed with a scheduled completion date of August 30, 1965. Modifications are being made to allow higher data transfer rates, communications capability for AMTRAN (system developed by Dr. Seitz), and other on-line systems, and increased flexibility for LIEF/HOSC interfacing.

NOTES 8/23/65 JAMES

S-IVB: We are in post-static checkout; still progressing toward a 9/3/65 shipping date. We are preparing a response to Dr. Rees' inquiry concerning the confidence level in S-IVB as compared to the S-IV Stage, the S-IVB Component Test Program; the condensed Checkout Schedule; etc. This is being coordinated with DAC and R&DO.

GSE: It appears that our completion date of 8/25/65 for delivery of all LC-34 ESE will be met. Because of the emphasis on LC-34 ESE deliveries, schedules for LC-37B and LC-39 have become critical. G. E. has taken the position that both jobs can't be done at Huntsville and hold any schedules. The decision has been made to transfer to G. E., Daytona, facility the procurement, fabrication and checkout of LC-37B equipment. Program control, systems engineering and configuration control remain with GE, Huntsville.

IU-201: We are just coming through a dark period on ESE as you well know. Deliveries are finally beginning to meet consistently the "promised dates." Throughout this ordeal there has been considerable speculation here and at Headquarters as to whether at the time this task was given to G. E., it was an impossible task. In any case, the ESE deliveries did not enhance our status. Now that ESE is moving, the IU status is becoming quite serious. Besides the computer and data adapter problem, plus overall assembly status (to include 35 red tags now on IU-201), we are held up by many mechanical problems. The ECS pump is late causing some changes to be put into the system; there is a late change to add a hand valve in the ECS system to permit filling and there is a late change to add a stand pipe into this system. Due to vibration problems, it is necessary to isolate the LVDA and LVDC. A late requirement has been generated for a check valve to be added to the purge system. Further, there appears to be a clearance problem with the LEM adapter. These, plus earlier mechanical problems, have resulted in changes which are almost sure to delay our going into checkout beyond any delay caused by the checkout station availability itself. In order not to be late at the Cape, even with VPG transportation as a must, Quality has had to squeeze the schedule for checkout extremely tight. In our earlier estimate we had reduced checkout time from a desired 58 days to a required 38 days. Further, over the weekend, problems in mechanical check indicated an additional 6 day delay in start of electrical check. During mechanical check when pressure was applied to the water methanol system, approximately 21 on-board leaks were detected. Some of these are serious enough to require replacement of cold plates; manifolds; flow meters; and other hardware. To hold our shipping date, this simple means it takes 6 more days out of checkout. We are at a point where this is beginning to hurt severely. After we have gotten into electrical checkout and established with confidence a receipt date of the LVDC and LVDA (do not believe the present shipping date of 9/10/65 will be met), we will reassess our status with elements of R&DO and determine checkout to be completed versus delivery to the Cape. I think these conditions are sufficient to make it quite clear that MSFC must give IU-201 all the effort required on a priority basis so that we as a Center do not become responsible for a slip in the launch date.

NOTES 8-23-65 KUERS

1. Improvement of Manufacturing Techniques: We know many areas where manufacturing processes and techniques as presently applied by our Prime Contractors and sub-contractors are marginal in producing hardware consistently within specifications desired by design engineers. The rate of defects, repairs, waivers, and rejects in welding, cleaning, flaring of tubes, brazing, bonding, etc. do not indicate so much human negligence but much more marginal techniques. After succeeding in production of the first acceptable hardware and stages, it is now our task to perfect, establish better controls, and improve manufacturing techniques jointly with the Prime Contractors in order to achieve better quality and reliability. As soon as our present high work load in-house would allow, we must put more effort in this work.

2. S-IC Assembly Progress:

-501: Two engines have been installed on this stage during the last week. Cable installation is in full progress. As a pleasant surprise, the cable harnesses developed by Boeing on the S-IC mock-up at Michoud fitted without rework. We also started to prefit and modify Rocketdyne insulation on the first engine of -501.

-502: The replacement of the fuel exclusion riser has been completed in an around-the-clock effort for the last three weeks with no impact on the assembly schedule. Calibration of this fuel container will be done by QUAL Laboratory early this week. Suction ducts for -502, supplied by Arrowhead, were found to be contaminated with chips and water and are being recleaned in our facilities. The last circumferential or close-out weld on the Lox Container for -502 has been accomplished during this week end.

NOTES 8/23/65 MAUS

1. SENATE HEARINGS ON AES - are scheduled for:

   Aug. 23 - Webb, Seamans and Mueller, as witnesses. Dr. Mueller's backup will be Gray, Jones, Lilly and Smolensky.

   Aug. 24 - Newell, Bisplinghoff, Finger and Hornig, as witnesses.

   Aug. 25 - Executive Session; Secretary Vance, Space Science Board, and a number of aerospace contractors, such as North American.

2. POP 65-3 REVIEW - The MSF Review of POP 65-3 was conducted at MSFC August 17-19. The Saturn IB, Saturn V and Engine Program Offices gave excellent presentations to a team headed by Chuck Koenig on the 17th and 18th. The review was concluded by a two-hour session with Gen. Phillips on the 19th. Nothing definite on the reprogramming of FY 66 funds within MSF resulted from the review. The consensus of the review team was that MSFC has funding problems, but they are not as serious as those at MSC and KSC. It was pointed out that the review team had already listened to requirements for $110 million (90 MSC and 20 KSC) more than the FY 66 Apollo availability.

3. MANNED SPACE FLIGHT POP 65-3 - Bud Abbott and Paul Jones are in headquarters August 23-25 to assist the Saturn Apollo Applications Office in finalization of the AES portion of the MSF POP 65-3 submission to Dr. Seamans.

4. SATURN IB STANDARD LAUNCH VEHICLE STUDY - On August 20, Messrs. Lowery, Meldrum and Gage of CCSD and Mr. Dickey of DAC visited MSFC to discuss this study and review the available information with Dr. Rees. Dr. Rees requested Mr. Lowery to make no distribution of the final report except to MSFC. Dr. Rees plans to send copies of the report to Dr. Mueller as he has requested. Mr. Meldrum and an MSFC representative will probably go to Washington to explain the report to Dr. Mueller. CCSD is to review the entire report to delete implications that the report is directed toward performance gain, rather than cost reduction. This week, CCSD will also review the report as it presently exists with each of the contributing contractors for their approval. Completed copies of the final report are expected to be received at MSFC about September 3.

NOTES 8/23/65 REINARTZ

No submission this week.

NOTES 8/23/65 RUDOLPH

1. S-II Battleship Stage Status - Due to interference with Common Bulkhead Test Tank (CBTT) testing, the Battleship test scheduled for Thursday, August 19, 1965, for 150 seconds was cancelled. The low end of propellant excursion is the primary loss due to cancellation of this test. This is not a critical loss and can be obtained in approximately three months.

This is the end of Phase II Battleship testing. The Battleship Stage is now being prepared for next phase of testing which includes flight engines, gimbal systems and P. U. Systems.

2. Common Bulkhead Test Tank - Test conducted on Friday, August 20, 1965, using LN_2 instead of LH_2. No apparent problems encountered. The LN_2 testing does not replace LH_2 testing. Ultrasonic testing is scheduled for tomorrow, August 24, 1965.

3. S-IVB Battleship Stage Status - The first full duration two (2) burn firing of the Saturn V configuration Battleship Stage was successfully accomplished on Tuesday, August 17, 1965.

The S-IVB Battleship Program at Sacramento was successfully completed on Friday, August 20, 1965, with the final firing in Saturn V configuration. The first burn of 170 seconds was followed by a second successful burn for 355 seconds.

Present plans now call for the removal of the Battleship Stage and conversion of Beta I Complex to automatic GSE.

NOTES 8/23/65 SPEER

1. Flight Control Data Flow Requirements: A combined MSC-MSFC review of information flow requirements for Apollo from remote sites to Houston (MCC-H) has resulted in a significant reduction of previous requirements. The S-IVB/IU requires the transmission of about 160 parameters with adequate accuracy and sampling rate. We are now requesting a bandwidth of 1 kb/s (formerly 2 kb/s). However, extensive remote site data processing and several transmission formats will be required to minimize the data flow to MCC-H. Cost reductions are expected in both transmission lines and MCC-H processing facilities.

2. GT-5: During the first launch attempt (8/19) the following difficulties were encountered: (a) H_2 leak in fuel cell; (b) concern about possible miscalculation of the waste water storage capability; (c) 3.5 hour hold due to inability of achieving full H_2 loading of fuel cell; (d) weather conditions at launch site; (e) failure of one commutator within the Gemini telemetry system; (f) uncertainty about consequences of an explosion in a communications manhole at the Cape.

3. Staffing of Mission Operations Office: Total strength approved: 33; Huntsville: 26; Houston: 6; OSRO (Wash): 1. At this time, 26 personnel have been identified and agreed to for transfer to Mission Operations. The actual strength of the Flight Control Office at Houston at this time is 4 MSFC, 6 IBM, and 1 DAC personnel. The ultimate total will be 20 personnel. Mr. Gorman has assigned physical space on 3rd floor of Bldg. 4202.

NOTES 8-23-65 STUHLINGER

1. PEGASUS C: Pegasus C continues to operate well. The hits are now 23 on the 1.5 mil for a flux of .21/m^2 day, 4 on the 8 mil for a flux of .017/m^2 day and 11 on the 16 mil for a flux of .003/m^2 day. These figures compare well with Pegasus B data. The spin rate is down to about 6°/sec and the total opening angle appears to be about 35°.

2. PEGASUS B: Pegasus B continues to operate well. The fluxes are nearly the same as for Pegasus C, and the motion remains the same.

3. SUPPORTING RESEARCH AND DEVELOPMENT PROGRAM: OART: The first response to our FY-66 program was received from OART in the form of program guidelines. Mr. Rosche and Mr. Gilstad of Space Vehicle Systems Office will visit this Center on September 2, 1965, to review the Launch Vehicle Loads and Structures Sub-Program. All arrangements have been finalized during this past week and no problems are anticipated. OMSF: Eighty-seven of the Apollo Supporting Development (904) Work Units have been submitted to OART for review. It was their impression that these Work Units would be approved. There are twenty-nine Work Units which are apparently questionable to MSF, and it is expected that a visit will be made to MSFC at a later date to obtain clarification. Two Work Units of $150,000 each have been approved and program authority issued to MSFC. These Work Units are "Impact on S-II Stage of Improved J-2 Engine" and "Impact on S-IVB Stage of Improved J-2 Engine."

4. MOON-BASED ASTRONOMICAL OBSERVATORY: (Reply to your recent question.) The Astronomical Subcommittee of the Space Science Steering Committee considers that the moon offers an attractive base, possibly unique, for astronomical observations. The Subcommittee recommends that studies begin as soon as possible to explore the lunar capabilities for astronomy. This will involve evaluating engineering studies on earth, environmental studies on the moon, and testing with small telescopes on the moon.

The following instruments were discussed and recommended for early lunar missions: 12-inch wide angle telescope; 12-inch high resolution telescope (unanimously endorsed by Subcommittee); Einstein problem instrument (bending of light in gravitational fields); Interstellar telescope (a 40-inch telescope). Major opinion of the Subcommittee was that all of these represent "good science" and should be considered for the 1970-1975 time period.

5. IN-FLIGHT EXPERIMENTS OFFICE: R-DIR suggested that the responsibility for the In-Flight Experiments Office, which had been one of the functions of Dr. Kuettner's office, be assigned to Research Projects Laboratory. After several discussions with H. Weidner, J. Kuettner, F. Williams, and D. Cook, I agree that this assignment would be logical in view of other assignments of RPL in related fields. However, a group with an initial strength of 5 people (one chief, 4 associates) must be established before work on this assignment can begin. I will complement this group with assistance and support from existing RPL personnel as much as possible. Permission to recruit these 5 personnel should be given as soon as possible.

NOTES 8/23/65 WILLIAMS

Negative report.

August 30, 1965

OFFICE OF DIRECTOR – MSFC

CODE	NAME	INIT.	☐ ACTION	☐ INFORMATION

REMARKS

This is to inform you that Dr. von Braun has read and initialed all of the August 16 and 23 NOTES; however, he did not make any comments to the NOTES. To eliminate the expense of reproduction, these initialed NOTES are not being reporduced and distributed. Your original NOTES are returned as attached.

CODE	NAME	DATE

MSFC - Form 495 (Rev August 1963)

B 9/25

NOTES 8/30/65 BALCH

1. Meetings were held concerning Aetron's anticipated increased cost on Contract NAS8-5576 (Tech. Systems, Phase 1) of up to $4.2 million. ✓

2. Negotiations are to begin with GE for its FY-66 workscope this next Wednesday, September 1, 1965. ✓

3. The installation of the H7-17 Fit-up Fixture was successfully accomplished on August 29, 1965. ✓

NOTES 8-30-65 BELEW

B 9/25

H-1 ENGINE Negotiations for the extension of Contract NAS 7-162, to produce 22 engines in support of Vehicles SA-210 through SA-212, have been temporarily terminated. Agreement has not been reached between Rocketdyne and MSFC negotiators due to the cost proposed. The contractor has been requested to re-evaluate the proposal for a downward cost adjustment and return on September 14 to resume negotiations.

F-1 ENGINE An FRT configuration injector with improved ring-to-land braze joints (gold plated rings) is being tested at MSFC. It has accumulated eight starts for 669 seconds and has been removed from the engine for dye penetrant inspection. Testing of a similar injector has started at NASA/RETS, Edwards Air Force Base and has accumulated 625 seconds in five starts without visible cracks. These tests are being run to validate gold plating as a braze separation fix prior to retrofit of engines for S-IC-1 and S-IC-2.

Engine F-4018 (the second engine for S-IC-2) arrived at MSFC via Guppy aircraft August 24.

RL10 ENGINE Negotiations with Pratt and Whitney Aircraft were completed last week for the two-year follow-on RL10 engine development contract (incentive type). It is expected that the completed contract package will be sent to NASA Headquarters for approval during the week of September 13. The contract is scheduled to go into effect on October 1.

J-2 ENGINE Two 230K/5.5 mixture ratio engines are undergoing evaluation testing. Engine J018 will attempt seven successive full duration tests to demonstrate that the 230K engine can endure the required service life at the increased thrust level. Engine J005-4 is in the altitude simulation test stand for sea level/altitude performance comparison.

Four production engines were delivered last week. Three for S-II 501 and the single engine for S-IVB 501. Production engine J-2036 (S-II Battleship engine) completed acceptance testing and is presently undergoing post-firing checkout. Engines J-2034 (S-II Battleship engine) and J-2037 (QUAL engine) are presently being acceptance tested.

An FRT review meeting is scheduled for next week at Rocketdyne to complete the resolution of component deficiencies prior to starting QUAL I test series.

The next J-2 Engine Quarterly Review will be held at Rocketdyne on September 13 and 14, 1965.

The production incentive contract conversion (NAS 8-5603) has been forwarded to Rocketdyne for signature.

Headquarters has given the go-ahead for Phase II AEDC altitude simulation test program.

NOTES 8-30-65 CLINE

B 9/25

NEGATIVE REPORT

NOTES 8/30/65 CONSTAN

B 9/25

1. PREPROPOSAL CONFERENCE

A bidders' conference for prospective bidders on the Computer Support Contract was held at the Michoud Assembly Facility on August 25, 1965. The conference included briefing by MAF personnel, tours of the computer area at Building 350 and the Computation Office at Slidell, and a question and answer session relative to the RFP.

2. VEHICLE STATUS - BOEING

S-IC-F Vehicle - The F Vehicle was transferred from the VAB to the Horizontal Installation Area on August 25 for final component installation. The vehicle was transferred from the Stage Transporter to Support Stands in the area to allow removal and use of the transporter in Huntsville. The transporter is being barge loaded in preparation for shipment.

S-IC-D Vehicle - Horizontal installation operations were completed on the D Vehicle on August 25, and the vehicle was moved to the Stage Test Position Facility for checkout operations. It is planned that the stage will complete checkout operations on schedule and will be delivered on-dock Huntsville on or before October 15, 1965.

NOTES/8-30-65/COOK

B 9/25

1. NASA POLICY DIRECTIVE "RELIABILITY AND QUALITY ASSURANCE POLICY AS APPLIED TO NASA PROGRAMS": R-QUAL is coordinating MSFC comments to the NASA Policy Directive on R&QA as applied to NASA Programs. Comments will be consolidated and transmitted to NASA Headquarters, Code KR, over DIR signature. Completion is due September 2, 1965. ✓

2. GEMINI GT-4 FAILURE ANALYSES: R-OM-V is coordinating the preparation of comments for DIR on the failure reports issued by the FT-4 Design Certification Board. R-ASTR and R-P&VE are studying the individual reports. Completion is due September 2, 1965. ✓

3. S-IC STAGE: The scheduled date for automatic firing of S-IC-T will be slipped from September 24 to October 5 because of delays in installation of automatic checkout equipment. ✓

4. LITTLE JOE: The briefing to Dr. Rees scheduled for August 27 was deferred until September 17. Several additional questions have come out of preparation for the briefing. The R-AERO proposal to utilize Little Joe II vehicles for Saturn V 40 percent model unsteady aerodynamic studies is predicated upon lack of sound correlation between wind tunnel tests and flight environments. Additional questions to be answered are; (a) whether the monies to be spent on the program might not better be utilized for structural fixes; (b) what form the structural fixes could take, recognizing the constraint of fixed flight schedules; (c) weight penalties for structural fixes and costs for structural fixes. R-P&VE has been furnished a new flight environment by R-AERO. The briefing on September 17 will analyze all questions stated above. In summary, the problem will be completely analyzed and recommendations, alternate solutions, schedule and costs will be presented. Industrial Operations will participate. ✓

5. FUNDING FOR R&DO STATE-OF-THE-ART TASKS: R-OM is investigating the possibility of allocating a percentage or set amount of MSF program funds for state-of-the-art tasks. ✓ These funds would be included as part of the program budget submission to MSF, in addition to basic program requirements. Upon approval, these funds would be under the cognizance of R-DIR, who would recommend to DIR the tasks to be supported with the funds. ✓

NOTES 8-30-65 DANNENBERG

B 9/25

1. Experiment Coordination - MSF has established an Experiments Division, headed by Mr. Ted George, as an element of Mr. Gray's organization. The office is responsible for experiment generation, program control, funding, etc. The division will serve as an interface with the Program Offices and Field Centers. It will provide staff continuity, contact within and outside MSF, to assure sufficient experiment payloads. ✓

2. PRB Meeting - The status of ICDs was reviewed and accepted by the PRB. The concept of preliminary ICDs has been deleted; a draft on "criteria for ICDs" was adopted and is being distributed for application to ICDs to be generated in the future. ✓

3. Saturn V ICDs - A matrix for individual stages and their relationships with other stages (including spacecraft modules), test and launch facilities, and with transportation and checkout equipment is being prepared by Boeing to give Program Management the needed visibility. The implementation of all ICDs will be assured by incorporating these ICDs into the proper Contract End Items (CEI) specifications. ✓

4. Configuration Management - has determined that all ICDs in contractual effect as of 4-8-65, have established the CEI baseline. Incorporation of new ICDs will require change board action; also, major changes to existing ICDs will require formal change procedures. ✓

NOTES 8/30/65 GEISSLER

B 9/25

1. Saturn V Max Heating Trajectory: This topic, discussed in the S-II Problems Meeting (August 18-19 and reported in Notes 8/23/65 Geissler, was also discussed at the Vehicle Dynamics and Control Working Group Meeting at S&ID on August 19. At the latter meeting, it was concluded that the max heating trajectory developed by S&ID (contained in CEI spec.) was a hotter trajectory than the 160 km max heating trajectory which is in the process of being approved for vehicle design. The S-II stage is designed to the S&ID max heating trajectory and no design impact is expected by incorporating the 160 km max heating trajectory as the official design trajectory.

2. Structural Separation between Command and Service Modules: Changes in procedures for mating the Command and Service Modules have not succeeded in eliminating the loss of contact of the compression pads. Assembly procedure changes were worked out with responsible representatives of MSC and NAA and the actual mating at the dynamic test stand was monitored carefully. Preliminary data from Saturn IB upper-stage configuration tests indicate conclusively that separation is occurring. Arrangements are being made for MSC and NAA personnel to observe further tests of this configuration on the Saturn IB Dynamic Test Stand. We are concerned about the resulting cross coupling between the three control axes which is very difficult to predict analytically. We are making a strong effort to understand the situation and to find out if we can live with the existing condition.

E.G. Could this problem result in a temporary grounding of SA-201? B

3. Saturn IB Retro-Rocket Plume Impingement: Re: Notes 8/16/65 Geissler. During the recent S-IVB VD&CWG meeting the Saturn IB retro-rocket plume impingement problem was discussed. If one retro-rocket fails (present separation criteria is one retro-rocket out capability) the unsymmetrical pressure will induce a turning moment rotating the connected S-IB stage and S-IB/S-IVB interstage, causing a collision of the interstage and J-2 engine bell. Possible solutions are (1) Delete one retro-rocket out separation criteria with present configuration. (2) Change the retro-rocket nozzle cant angle and/or expansion ratio. (3) Move the retro-rockets radially outboard. Since the present reliability of the retro-rocket system is 0.998, which keeps the overall S-IVB stage reliability within the 0.95 requirement (separation retro-rocket out criteria was based on unreliability of retro system) and since (2) and (3) require hardware change, solution (1) appears to be most feasible. We are presently determining if the retro-out requirement can be relaxed for AS-201 & 202. There also appears to be a problem during nominal S-IB/S-IVB separation due to plume impingement. That is, the crushing force on the interstage due to plume impingement may require a minor local structural beef-up. Analyses are continuing.

4. Status of Compliance Mode Dynamics and The Effect on Flight Control and Stability: The effect on the S-II control system of the undefined deflections in the thrust structure (discussed in Aug. 18 S-II Technical Problem Review) has been thoroughly analyzed by NAA/S&ID. No adverse effects were found.

NOTES 8-30-65 GRAU

B 9/25

1. S-IVB PROGRAM: Final Post-static checkout has been completed on the S-IVB 201 stage. Checkout operations evaluation and preparations for shipment to KSC are underway. The stage will be loaded on the barge September 2, 1965. The S-IVB 203 stage continues in continuity and megger checking. Many missing components have delayed the beginning of automatic checkout. This Laboratory is concerned about a proposal plan for S-IVB 203 which includes as little or less Postmanufacturing checkout than was accomplished on S-IVB 201. The list of test procedures applicable to this operation for example, contain no pneumatic testing, and very little electrical checkout. The reason for such an abbreviated checkout has not yet been determined.

11 12

2. IU 201 CHECKOUT: IU 201 was released to checkout August 27, 1965 and alignment operations began immediately. IBM has experienced difficulties with the water/menthanol system, electrical continuity testing and in generating proper operating procedures, but hopefully the unit will begin electrical checkout today. IO desires IU 201 to be released from checkout September 30, 1965. This release date leaves a nine day shortage in required checkout time. We are presently examining the alternatives.

3. RL10 ENGINE: As reported in previous "NOTES" we had intended to delegate the bulk of the quality functions at Pratt and Whitney, West Palm Beach, Florida, to the Navy. It now appears that to accomplish this delegation may require that MSFC provide 12 spaces to the Navy. To transfer spaces would defeat the initial purpose of the delegation; which was to provide six spaces to MSFC to support other programs. Consequently, we are withholding the delegation until it is determined that we can in fact accomplish our original objective.

NOTES 8/30/65 HAEUSSERMANN

B 9/25

No submission this week.

NOTES 8/30/65 HEIMBURG

B 9/25

1. F-1 ENGINE

Four F-1 Engine tests were conducted this week. Engine F-2009 at the West Area Test Stand was tested for approximately 154 seconds for a total mainstage time of 669 seconds in 8 starts on the high strength gold plated injector. Engine F-2009 will be removed and the main injector will be dye-checked at this time to determine if cracking has occurred. Three tests were conducted on Engine F-3T1 to calibrate this engine.

2. S-IC

The S-IC-T firing is scheduled for 10/5. Steps are being taken by ME to assure delivery of stage distributors on time. Results of LOX prevalve (Air Research) tests conducted on the F-1 turbopump test stand indicate that this valve cannot meet the closing time specifications.

3. S-IVB TEST STAND (MSFC)

The next test is scheduled for 9/2.

4. S-IVB STAGE (SACTO)

Preparations are being made to ship Stage 201 from Sacramento on 9/3. Stage 202 will be installed on Beta III within two days after shipment of Stage 201. We are opposed to DAC proposal to delete propellant loading and hot gimbal requirement on 202 stage since gimbaling is a critcal stage requirement and the successful use of atuomated equipment pre-supposes a definite knowledge of time constants.

5. S-II BATTLESHIP

S&ID is moving ahead with changes i.e., the J-2 engines have been removed; the LH_2 feed line bellows are being replaced; the water spray heat shield has been removed, disassembled, and is being sent to a warehouse for storage; the LH_2 loading sled is being removed and the spare sled from Coca 4 will be installed; the crane on Battleship stand has been inoperative and has delayed LH_2 tank entrance.

6. COMMON BULKHEAD TESTING SANTA SUSANA S-II

Growler tests are being made on the common bulkhead test article to check effect of LN_2 tanking during the weekend of 8/22. The LH_2 tanking test will get underway in September.

7. RANDOM MOTION SIMULATORS

During acceptance checkouts of two simulators (Command Module and S-II Combination positions) the connecting linkages between the drive cylinders and the moving carriages failed. Failure traced to marginal design of bearing housings coupled with "over-rated" bearings supplied by AMF subcontractor which not only effects failed positions but all eight positions. An AMF redesigned housing will be fabricated in-house, however, supply of bearing inserts for all simulators appears pacing item. Checkouts continuing at reduced amplitudes and frequencies with acceptance of all simulators slipping to mid-October.

NOTES 8-30-65 HOELZER

B 9/25

Negative Report

B 9/25

NOTES 8/30/65 JAMES

S-IVB 201: Post-static checkout was completed August 25 and the stage is being prepared for shipment to KSC on September 3.

GSE: All GSE equipment necessary to permit initiation of S-IB GETS has been delivered to SDF except three items which are expected to be delivered today. All but sixteen items critical to initiation of GETS have been shipped to VLF 34. The sixteen items should be shipped today.

IU 201: Leak tests of the ECS have been completed. As mentioned in my notes last week, we encountered considerable difficulty with this system during leak tests. It was necessary to use 202 and 203 hardware to get a manifold system working. X-ray of the welds showed cracks and high porosity. These conditions are currently under study with R&DO and it will be necessary to make a decision later as to their acceptability for flight. The manifolds currently in 201 are of a different design than those in 200V which underwent vibration testing. The current "201" design is in 500V and planned vibration testing will provide us with information concerning the flight worthiness of this hardware. Checkout started Thursday with alignment checks. Out of roundness of the IU and its effect on the ST-124M mounting ring resulted in these tests being halted until the situation can be further analyzed. Hookup of the IU to the ESE was completed Sunday and power was applied last night. The changes mentioned last week (hand valve, stand pipe and check valve) are currently planned for installation after checkout and during preparation for shipment. IBM-Owego has indicated a delivery for the 201 flight DC and DA for September 18. This is based on a seven-day, 24-hour workweek and any trouble encountered would result in further delay. We will have to assess the situation after delivery of this hardware to determine if we install it here or at the Cape. The design fix on the isolation problem for this hardware has been validated. This change will have to be worked after checkout or at the Cape. The IU is still our SA-201 pacer and a continued emphasis is required by all elements at MSFC.

PRESSURE SWITCHES (Reference Grau's Notes 8/16/65): We are working with R&DO and our contractors to analyze the switch failure history and determine actions which may be required for 201. A report of this activity will be forwarded to you later.

NOTES 8-30-65 KUERS

B 9/25

Negative reply.

NOTES 8/30/65 MAUS

B 9/25

1. NASA AES FY 67 BUDGET (POP 65-3) - Last week, Bud Abbott assisted MSF in preparing a number of optional AES program plans with companion cost estimates, to provide Dr. Seamans with detailed data to discuss the FY 67 AES funding level with BOB. This will allow Dr. Seamans to tell BOB the effect, in terms of flight and mission rates and dates, of successively lower FY 67 total funding levels on the AES program. Flight and mission options being prepared are:

- A 6 x 6 x 8 flight rate with first extended S/C available in Dec 69.
- A 6 x 6 x 8 flight rate with first extended S/C available in Jan 71.
- A 3 x 3 x 5 flight rate with first extended S/C available in Dec 69.
- A 3 x 3 x 5 flight rate with first extended S/C available in Jan 71.

Three basic FY 67 funding levels will be discussed in the amounts of 100, 250 and 350 million. The 350M level is approximately what is required to start an AES program as Dr. Mueller would like. (6 x 6 x 8 rate with early extended S/C availability and a heavy experiment program). The 250M level is sufficient to initiate a sizable AES program but will not allow the quantity of flight experiments that Dr. Mueller feels is optimum. The 100M funding level will not allow any desirable AES program and will only initiate a lower rate, later flight program.

The results of the cost-out of these options will be presented to Dr. Mueller on August 31, to Dr. Seamans on September 15, and to BOB shortly thereafter.

URGENT ↓ ! B

HM. This is an important piece of info that I may want to bring to Mr. Webb's attention during his 9 October visit in HSV with the Dir of BOB. Please update and/or verify these figures just before that date B

2. END-OF-YEAR PROCUREMENT PROBLEM - Don Messer is working with Mr. Hardeman on his Small Procurement Obligations Committee to improve the internal End-of-Year Procurement Problem. A course of action, dealing primarily with R&D and AO(Administrative Operations) has been developed as follows:

- Procurements will be divided into Procurement Management Areas, and appropriate internal fiscal years will be defined for each area;
- A review will be made of FY 66 plans at task level for Advanced Studies and SRT projects to determine re-planning necessary to assure a relatively constant procurement workload throughout the year.
- Surveys will be made with R&DO, Mgmt Svcs Ofc and Tech Svcs Ofc to determine compatible tasks which may be consolidated into one contract package.
- The Small Procurement Obligations Committee will be responsible for developing and implementing a Procurement Management Control System.

B 9/25

NOTES 8/30/65 REINARTZ

STUDY CONTRACT WITH GD/C: The first review of the design study contract with GD/C was held in San Diego on August 25. Colonel Russell and Mr. Fero of Headquarters attended along with MSFC and LeRC personnel. The primary accomplishment of the meeting was the receipt of a study schedule. The following seven technical areas were discussed: control systems; guidance systems; propellant control systems; propulsion systems; electrical systems; telemetry, instrumentation, RF and antenna systems; and ground support equipment. No report was given on lightweight insulation or on structures. Although it is evident that GD/C has progressed on the study effort, the results made available to MSFC to date are not consistent with the overall program schedule. Certain critical areas such as structures and umbilicals have not progressed on a schedule consistent with the first launch. My estimate is that some designs will be released from one to three months late unless the free flow of information between MSFC and GD/C is made possible.

No information on cost expended to date on the study was given at the review even though Colonel Russell requested that he be given this information since he is responsible to Dr. Mueller for accounting status on GD/C expenditures.

The next review is set for September 22. The location has not been determined since LeRC did not agree with MSFC that the review should be held at GD/C.

NOTES 8/30/65 RUDOLPH B 9/25

1. S-IC-2 Stage Status - (Reference Notes 8/16/65 Rudolph, cy attached) The following two actions have been assigned re the Fuel Tank exclusion riser problem:

(1) Boeing will investigate and recommend redesign to eliminate problem.

(2) P&VE will report on feasibility of replacing foam with flexible bladder.

A joint MSFC-Boeing review is planned for early Sept '65.

2. S-II Stage Tenth Quarterly Review - The S-II Stage Quarterly Review is scheduled for Tuesday, August 31, 1965, at S&ID, Downey, California.

3. S-II Common Bulkhead Test Tank (CBTT) - Ultrasonic testing has begun and is scheduled for completion on Wednesday, Sept 1, 1965.

4. S-II-T Stage Status - Meeting between NASA/S&ID to review status of S-II-T was held on Tuesday, August 24, 1965. Assessment of S-II-T Project revealed current status of insulation, stage hardware and GSE will necessitate delivery from Seal Beach later than September 3, 1965, schedule date. Estimated revised S-II-T shipping date is Friday, September 24, 1965. Delay in shipping date from Seal Beach (from Sept 3 to Sept 24) will cause the Point Barrow to be available for shipment of S-II-S/D to MSFC on Friday, Oct 29, 1965, instead of Saturday, October 23, 1965, as scheduled. Expected arrival of S-II-S/D at MSFC is Sunday, November 21, 1965, six days late.

5. S-II-1 Stage Status - The Common Bulkhead is complete and ready for ultrasonic inspection and processing.

6. Saturn V IU Checkout Station - Huntsville - The RCA 110A Computer was delivered to IBM on the 23rd and 24th of August. Installation is currently in progress and is expected to be completed on or about Friday, September 3, 1965. Checkout and acceptance is expected to take place during the period Tuesday, September 7 - Thursday, September 16, 1965.

Delivery of displays by Sanders Associates has slipped again and it has become necessary to accomplish 501 Checkout using a modified Saturn I Display System. The Saturn I display equipment has been properly modified and checked out and is expected to be delivered to IBM during the week of August 30, 1965. Expected delivery date of the Sanders Operational Display System does not impact the February 1966 wet test at KSC.

7. S-IVB Battleship Test Program - The S-IVB Battleship program was completed on Friday, Aug.20, 1965, with a successful one orbit Saturn V Restart Test. The J-2 engine is being removed from the stage and will be shipped to S&ID this week. The stage will be removed from Beta 1 stand by Wednesday, Sept 1, 1965, and the stand modified to acceptance test S-IVB-203.

Attachment: Notes 8/16/65 Rudolph (DIR, I-DIR and R-DIR's copy only)

B 8/21

NOTES 8/16/65 RUDOLPH

1. MSFC Meeting Policy - My Notes 8/2/65 (Item 1, copy attached) expressed concern of a continuing major problem of Center meeting schedule conflicts. Again, this week we are confronted with this problem. Your Policy Memorandum of June 11, 1965, clearly states that "no major Center-level meetings or visits will be held on or scheduled for Monday of each week". Based on this Policy, Saturn V Program Office Staff Meetings are scheduled each Monday afternoon (following the regular Monday morning, IO Staff Meeting). In direct conflict with your Policy, Center level meetings scheduled for Monday appear to be the rule rather than the exception. Example - MSFC "dry run" for Panel Review Board Meeting 65-4, scheduled for today, August 16, 1965 at 2 pm.

2. S-IC-1 Stage Status - Delivery to R-QUAL is expected on Monday, Sept 27, 1965, as scheduled.

3. S-IC-2 Stage Status - The Fuel Tank exclusion riser segments fractured and the cover fabric split during hydrostatic testing. Repairs have been completed and no schedule delay will result.

MATT URLAUB. We should look for a tri-major meeting on this. E Rao

4. S-II Battleship Stage:

The S-II Battleship was successfully fired on Monday, August 9, 1965, for full duration. The cut-off was from fuel depletion as planned at approximately 392 seconds. All test objectives were accomplished.

The S-II Battleship was fired on Thursday, August 12, 1965, for 107 seconds duration. Planned duration was 150 seconds. Premature manual cut-off was due to fire on engines 2, 3, and 5. Cause of fire not yet determined.

Attachment: Notes 8/2/65 Rudolph (DIR, I-DIR and R-DIR's copy only)

Arthur Rudolph: I suffer with you on this issue, but due to Webb's visit and many other unforeseen engagements there was just no other possibility. Once-in-a-while, I hope only rarely, we will have to violate our ruling of June 11, 65. E. Rao 8/21

NOTES SPEER 8/30/65

B 9/2

1. AS-201 Mission Rules: Dr. Mueller has signed the MSF Mission Rules Guidelines on 8/16 based on recommendations by Mr. Christensen's Ad Hoc Committee. MSFC's inputs have been considered. First issue of MSC's detailed Flight Mission Rules were published on 8/1. Launch Mission Rules are to be published by KSC. Preliminary MSFC inputs were submitted to KSC on 8/26. The total of MSFC onboard measurements considered mandatory for launch now stands at 85. Each of these measurements will be carefully reviewed before final mission rules are issued in an attempt to reduce the total number. However, a relatively large number will remain as consequence of primary mission objectives assigned.

2. OSRO: A joint NASA/DOD Working Group Meeting is scheduled from 9/8 to 9/10 at MSC to form a Program Support Requirements Document (PSRD) management group for documentation systems. Invited to attend: OTDA, OART, OSSA, MSC, KSC, MSFC, GSFC. Messrs. Kurtz and Emanuel will represent MSFC.

NOTES 8-30-65 Stuhlinger B 9/25

1. PEGASUS: Due to shutdown of the B 5500 computer in Computation Laboratory from August 20 to August 30, we are not up to date with exact hit data. However, indications are that Pegasus C continues to operate properly.

2. AES: The lunar surface experimentation program on which RPL has been working during past months was recently expanded to include study and development work of a hand-held lunar surveying staff ("Jacobs Staff"). The staff will carry surveying instruments, a camera, and a kind of transponder which, in combination with a base station on the LSSM Vehicle, will permit the exact determination of the location of the staff with respect to the LSSM Vehicle. We will request Dr. Shoemaker from U.S.G.S. to review our work statement for this task before submission to OMSF and OSSA. The first year's contracted effort will result in a functional prototype of the staff ($1. M).

3. STATUS OF OART FY-66 PROGRAM: This Center's FY-66 Guidelines have been received and made available to each of the Laboratories. Due to the late arrival of this Center's Overceiling Program, it is anticipated that additional authority will be received to cover a portion of these requirements. Excluding Pegasus, guidelines for the annual plan are $13,910K as opposed to $17,030K requested. The Overceiling OART Program, submitted by this Center is $11,808K.

NOTES 8/30/65 WILLIAMS

B 9/25—

Negative reply.